PB86-181328

# TUPOS-P: A Program for Analyzing Hourly and Partial Concentration Files Produced by TUPOS

Aerocomp, Inc., Costa Mesa, CA

Prepared for

Environmental Protection Agency
Research Triangle Park, NC

Apr 86

**U.S. Department of Commerce**
**National Technical Information Service**
**NTIS**

PB86-181328

EPA/600/8-86/012
April 1986

# TUPOS-P -- A PROGRAM FOR ANALYZING HOURLY AND PARTIAL CONCENTRATION FILES PRODUCED BY TUPOS

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Contract No. EPA 68-02-3750

ATMOSPHERIC SCIENCES RESEARCH LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
U. S. ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

## TECHNICAL REPORT DATA

*(Please read Instructions on the reverse before completing)*

1. REPORT NO.
EPA/600/8-86/012

2.

3. RECIPIENT'S ACCESSION NO.
PB86 181328/AS

4. TITLE AND SUBTITLE
TUPOS-P -- A PROGRAM FOR ANALYZING HOURLY AND PARTIAL CONCENTRATION FILES PRODUCED BY TUPOS

5. REPORT DATE
April 1986

6. PERFORMING ORGANIZATION CODE

7. AUTHOR(S)
*D. Bruce Turner, **Thomas Chico and Joseph Catalano

8. PERFORMING ORGANIZATION REPORT NO.

9. PERFORMING ORGANIZATION NAME AND ADDRESS
*EOB/ASRL/MD RTP, NC 27711
**Aerocomp, Inc.
3303 Harbor Boulevard
Costa Mesa, CA 92626

10. PROGRAM ELEMENT NO.
CDTA1D/04 - 0275 (FY-86)

11. CONTRACT/GRANT NO.
EPA 68-02-3750

12. SPONSORING AGENCY NAME AND ADDRESS
Atmospheric Sciences Research Laboratory -- RTP, NC
Office of Research and Development
U. S. Environmental Protection Agency
Research Triangle Park, NC 27711

13. TYPE OF REPORT AND PERIOD COVERED

14. SPONSORING AGENCY CODE
EPA/600/09

15. SUPPLEMENTARY NOTES

16. ABSTRACT

TUPOS-P is a postprocessor program for analyzing concentration files produced by the air quality dispersion model TUPOS (Turner et al., 1985). The program reads either hourly concentration or hourly partial concentration files and provides the following output:

- Hourly concentration summaries,
- Averaging period concentration summaries, and
- High-five concentration tables for five averaging times (1-hr, 3-hrs, 8-hrs, 24-hrs, and an averaging time selected by the user).

If the concentration file being read consists of partial contributions, the user may request hourly contribution summaries and averaging period contribution summaries for up to 25 significant sources. Much of the printed output is optionally available so that unneeded output volume is avoided.

17. KEY WORDS AND DOCUMENT ANALYSIS

| a. DESCRIPTORS | b. IDENTIFIERS/OPEN ENDED TERMS | c. COSATI Field/Group |
|---|---|---|
| | | |

18. DISTRIBUTION STATEMENT
RELEASE TO PUBLIC

19. SECURITY CLASS (This Report)
UNCLASSIFIED

20. SECURITY CLASS (This page)
UNCLASSIFIED

21. NO. OF PAGES
107

22. PRICE

EPA Form 2220-1 (Rev. 4-77) PREVIOUS EDITION IS OBSOLETE

## NOTICE

The information in this document has been funded by the United State Environmental Protection Agency under contract No. EPA 68-02-3750 to Aerocomp, Inc. It has been subject to the Agency's peer and administrative review, and it has been approved for publication as an EPA document.

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## AFFILIATION

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# PREFACE

One area of research within the Meteorology and Assessment Division is development, evaluation, validation, and application of models and postprocessors for air quality simulation, photochemistry, and meteorology. The models must be able to describe air quality and atmospheric processes affecting the dispersion of airborne pollutants on scales ranging from local to global. Within the Division, the Environmental Operations Branch adapts and evaluates new and existing meteorological dispersion models and postprocessors, tailors effective programs for recurring user application, and makes these programs available through EPA's User's Network for Applied Modeling of Air Pollution (UNAMAP) system.

TUPOS-P is an adaptation of the summary calculations of MPTER, which produces hourly summaries, averaging period summaries, and "high-five" concentration tables. If the concentration file being read by TUPOS-P consists of hourly partial concentrations, then the user may request hourly contributions summaries and averaging period contribution summaries.

Although attempts are made to thoroughly check computer programs with a wide variety of input data, errors are occasionally found. Revisions may be obtained as they are issued by completing and returning the form on the last page of this guide.

The first three sections of this document are directed to managers and project directors who wish to evaluate the applicability of the processor to their needs. Sections 4 and 5 are directed to engineers, meteorologists, and other scientists who are required to become familiar with the details of the postprocessor. Finally, Sections 5 through 7 are directed to persons responsible for implementing and executing the program.

Comments and suggestions regarding this publication should be directed to:

Chief, Environmental Operations Branch
Meteorology and Assessment Division (MD-80)
Environmental Protection Agency
Research Triangle Park, NC 27711.

Technical questions regarding use of the postprocessor should be directed to (919) 541-4564. Users within the Federal Government may call FTS 629-4564. Copies of the user's guide are available from the National Technical Information Service (NTIS), Springfield, VA 22161.

The next release of UNAMAP (Version 6) will include the code for TUPOS and TUPOS-P. Inquiries regarding the purchase of UNAMAP should be addressed to Computer Products, NTIS, Springfield, VA 22161 (phone number: 703-487-4763).

# ABSTRACT

TUPOS-P is a postprocessor program for analyzing concentration files produced by the air quality dispersion model TUPOS (Turner et al., 1986). The program reads either hourly concentration or hourly partial concentration files and provides the following output:

- Hourly concentration summaries,
- Averaging period concentration summaries, and
- High-five concentration tables for five averaging times (1-hr, 3-hrs, 8-hrs, 24-hrs, and an averaging time selected by the user).

If the concentration file being read consists of partial contributions, the user may request hourly contribution summaries and averaging period contribution summaries for up to 25 significant sources. Much of the printed output is optionally available so that unneeded output volume is avoided.

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# ACKNOWLEDGMENTS

The authors wish to express their appreciation to Mr. John S. Irwin and Mr. William B. Petersen for helpful comments regarding aspects of the work presented here. Portions of this text were excerpted from the MPTER user's guide.

The secretarial assistance of Sylvia B. Coltrane is greatly appreciated.

In addition to the listed authors of the user's guide, other Aerocomp personnel made important contributions to the document. Ms. Sarah Cunningham prepared all technical illustrations and produced the final document. Editorial review was provided by Ms. Vicki Catalano.

Support of Aerocomp by the Environmental Protection Agency Contract No. 68-02-3750 is also gratefully acknowledged.

# SECTION 1

# INTRODUCTION

TUPOS-P is a data handling postprocessor adapted from the summary calculations of MPTER (Pierce and Turner, 1980). The program reads either hourly concentration or partial concentration files created by the air quality dispersion model TUPOS (Turner et al., 1985) and provides the following optional output:

- Hourly concentration summaries,
- Averaging period concentration summaries, and
- High-five concentration tables for five averaging times (1-hr, 3-hr, 8-hr, 24-hr, and an averaging time selected by the user).

The hourly concentration file has a single concentration (that due to all sources) for each receptor for each hour. The partial concentration file contains the concentration that results from each source (partial concentration) for each receptor for each hour. If the concentration file being read consists of partial contributions, the user may request hourly contribution summaries and averaging period contribution summaries for up to 25 significant sources.

TUPOS-P was designed to maximize user control. For instance, the number of hours required to have valid 3-hr, 8-hr, 24-hr, or user-specified averaging period in the high-five tables is given by the user. In addition much of the printed output is optionally available so that unneeded output volume is avoided. Although TUPOS-P is specific to concentration files created by the dispersion model TUPOS (Turner et al., 1986), it can be easily modified to handle concentration files generated by other air quality models.

The first three sections are aimed at managers and project directors who wish to evaluate the applicability of TUPOS-P to their needs. Sections 4 and 5 are directed to dispersion meteorologists or engineers who are required to become familiar with the details of the postprocessor. Finally, Sections 5 through 7 are directed to persons responsible for implementing and executing the program. A listing of the FORTRAN source code is included in an appendix.

# SECTION 2

## DATA-REQUIREMENTS CHECKLIST

Proper execution of TUPOS-P requires summary period information, averaging period information, print options, and a list of significant sources if applicable. These are mentioned briefly here; more detail on proper formatting for data entry to the program is covered in Section 6.

Summary period information includes:

- Starting point for summary (year, Julian day, hour),
- Number of hours in the summary,
- Concentration file indicator: 0 for hourly concentrations; 1 for hourly partial concentrations, and
- Number of significant sources to be considered for the contribution summaries.

Averaging period information includes the following:

- Number of averaging periods to be summarized,
- Number of hours in the averaging period,
- Additional averaging time for the high-five table,
- Number of hours required to have a valid 3-hr, 8-hr, and 24-hr period, and
- Number of hours required to have a valid user-specified averaging period.

As mentioned earlier, much of the printed output is optional so that unneeded output can be omitted. For instance, the following ouput can be included or omitted according to the user's needs:

- Hourly summaries,
- Hourly partial contribution summaries,
- Averaging period summaries,
- Averaging period partial contribution summaries, and
- High-five tables.

The user supplies the list of sources to be included in the contribution summaries up to a maximum of 25 significant sources or can use any subset of the list supplied in the partial concentration file with the sources ordered by the significance criteria in TUPOS.

The primary input requirement for the program is, of course, the file containing hourly or partial concentrations. In order to use TUPOS-P without significant modification, the file must be generated by the dispersion model, TUPOS (Turner et al., 1986).

# SECTION 3

## FEATURES AND LIMITATIONS

User control and user friendliness were kept in mind during the design of TUPOS-P. Input data errors or inconsistencies result in an appropriate error message. Table 5 in Section 7 lists all possible error messages, along with a description of the problem and suggested corrective action.

The number of hours required to have a valid 3-hr, 8-hr, 24-hr, or user-specified averaging period in the high-five tables is entered by the user. Thus, if the user feels that 20 hours is sufficient to estimate a 24-hour average, then he so specifies. Also, much of the printed output is optionally available so the user's output volume can be tailored to his needs.

A modular approach was adopted in the TUPOS-P design. Thus, even though TUPOS-P is specific to concentration files created by TUPOS, it can be easily modified to handle concentration files generated by other air quality models.

# SECTION 4

## EXAMPLE PROBLEM

In this section, a hypothetical problem is provided to illustrate the use of TUPOS-P and the type of information it provides. Details concerning input and output for this example are discussed in Section 7 after the reader has become familiar with TUPOS-P input data preparation.

The partial concentration file used in this example was generated by the example problem provided in the TUPOS user's guide (Turner et al., 1986). The problem is illustrated in Figure 1. Variable westerly winds occurred at all levels throughout the 24-hour simulation period. Sampling was performed along two 30° arcs downwind of the sources (see Figure 1). The point sources used for the TUPOS example run are given in Table 1.

TABLE 1. POINT SOURCE EMISSION INVENTORY FOR THE EXAMPLE PROBLEM

| Source | Location | | | Emission rate | Stack parameters | | | |
|---|---|---|---|---|---|---|---|---|
| Number | X (km) | Y (km) | Elev (m) | $SO_2$ (g/s) | Hgt (m) | Temp (K) | Dia (m) | Vel (m/s) |
| 1 | 200.00 | 399.97 | 0 | 700 | 75 | 455 | 3.0 | 16.0 |
| 2 | 199.95 | 400.00 | 0 | 2750 | 165 | 425 | 4.0 | 38.0 |
| 3 | 200.00 | 400.03 | 0 | 10000 | 335 | 425 | 13.0 | 16.0 |

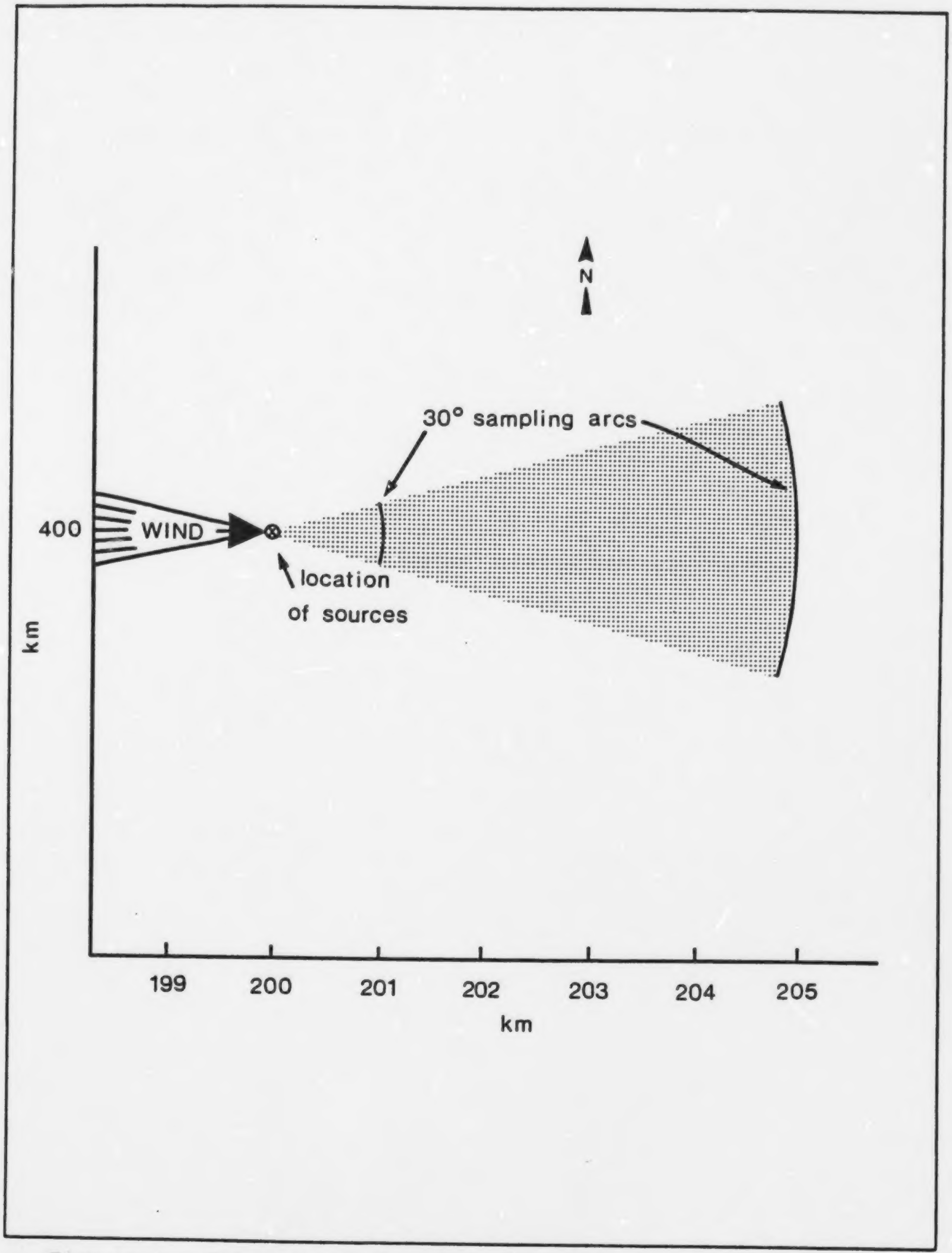

N
30° sampling arcs
400
WIND
location
of sources
km
199
200
201
202
203
204
205
km

Figure 1. Source/receptor geometry for the example problem.

The example problem was designed to calculate the concentration profile perpendicular to the approximate plume axis on two sampling arcs, one and five kilometers downstream from the sources. TUPOS-P can provide high-five tables for 1-hour, 3-hour, 8-hour, 24-hour, and a user-supplied averaging period.

This hypothetical problem forms the basis for the sample test discussed in Section 7. The input data and TUPOS-P generated output are provided there.

# SECTION 5

## COMPUTER ASPECTS OF THE POSTPROCESSOR

The general framework of TUPOS-P is discussed in this section. It is intended to give the reader a general knowledge of the computer program, rather than a detailed description of each subroutine. The overall structure of the program, the general processing flow, and a brief description of each subroutine are given in this section. Also provided is the overall system flow, which includes TUPOS-P, the input and output media, data flow, and the processor module.

### SYSTEM FLOW

Figure 2 outlines the overall system flow, which includes the processor, TUPOS. If TUPOS-P is to be used without modification, then the dispersion model TUPOS (Turner et al., 1986) must be used to generate the concentration files. As shown in the figure, TUPOS-P can be used to summarize either an hourly concentration file or an hourly partial concentration file.

### STRUCTURE OF TUPOS-P

The program has a hierarchical static structure which also represents the dynamic structure as closely as possible. Thus, modules at higher levels perform coordinating tasks, and those at lower levels perform calculations; also, the order of modules at the same level represents the order of their execution. Modules are named according to the following convention:

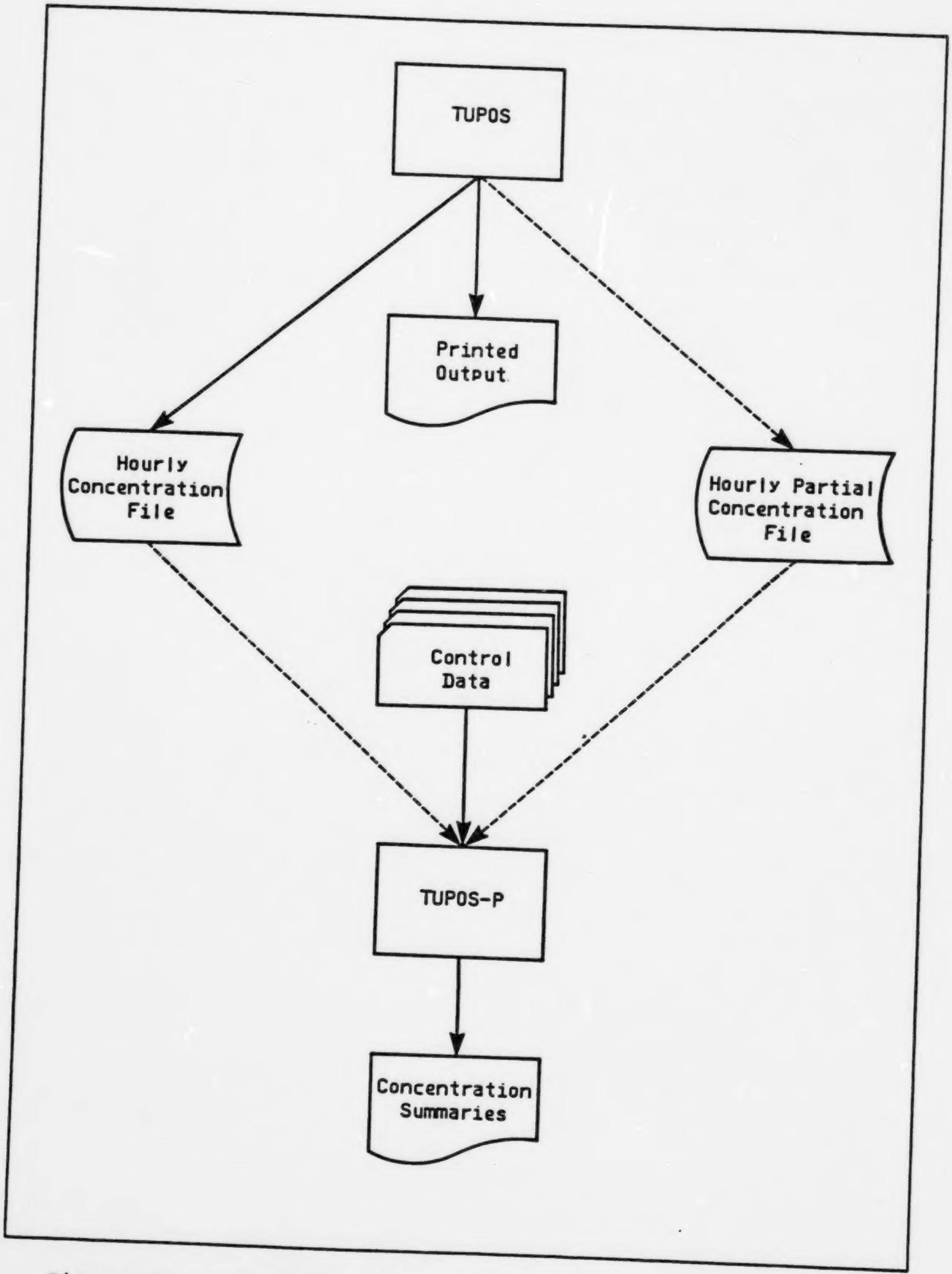

TUPOS
Printed Output
Hourly Concentration File
Hourly Partial Concentration File
Control Data
TUPOS-P
Concentration Summaries

Figure 2. System flow for TUPOS-P. Dashed line indicates optional flow.

TP1nn where TP represents TUPOS-P,
1 is the level number, and
nn is the sequence number of the module on level 1.

Figure 3 shows the program structure. Brief descriptions of the main program and subroutines follow.

TP100 -- This is the main program. It begins with introductory comments including the program abstract, authorship, program structure, and input/output units. After these introductory comments, the following tasks are performed by calls to subroutines TP210, TP220, TP230, and TP240: control inputs are read, header records from the concentration file are read, input data is processed, and concentrations are averaged. Program termination occurs exclusively in this module.

TP210 -- Called by the main routine, this subroutine reads all the program control information from FORTRAN unit 5 except for record type 8 (additional summary period). The subroutine begins with comments describing the input data stream.

TP220 -- This subroutine is called by the main routine and reads all the header information at the top of the concentration file. Error checking is performed to assure the user is accessing the proper file. Comments describing the record layout of the concentration file are provided at the beginning of the module.

TP230 -- Called by the main routine, this subroutine processes and echoes the input data.

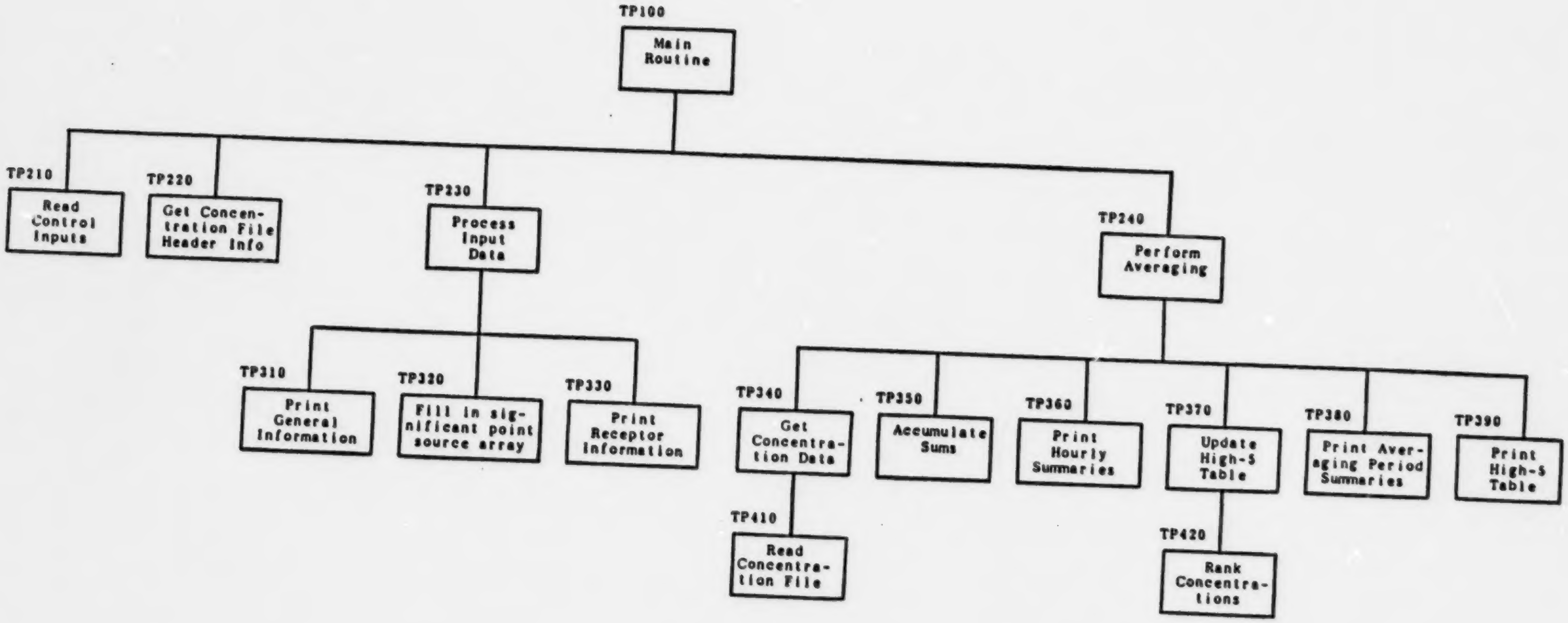

TP100
Main Routine
TP210
Read Control Inputs
TP220
Get Concentration File Header Info
TP230
Process Input Data
TP240
Perform Averaging
TP310
Print General Information
TP320
Fill in significant point source array
TP330
Print Receptor Information
TP340
Get Concentration Data
TP350
Accumulate Sums
TP360
Print Hourly Summaries
TP370
Update High-5 Table
TP380
Print Averaging Period Summaries
TP390
Print High-5 Table
TP410
Read Concentration File
TP420
Rank Concentrations

Figure 3. TUPOS-P program structure.

TP240 -- This subroutine is called by the main routine and performs the user-specified averaging. Any additional summary periods are read here.

TP310 -- Subroutine called by TP230 to print control information and concentration file header information.

TP320 -- Called by subroutine TP230, this subroutine fills in the significant point source array. Also point sources specified by the user as significant are flagged.

TP330 -- This subroutine is called by TP230 to print the receptor table with appropriate footnotes.

TP340 -- Called by TP240 to get the concentration data. TP340 calls subroutine TP410 to perform the actual I/O to the concentration file (unit 9).

TP350 -- Subroutine called by TP240 to add hourly concentrations or hourly partial concentrations to various sums.

TP360 -- This subroutine is called by subroutine TP240 to print hourly concentration results.

TP370 -- This subroutine is called by subroutine TP240 and updates the high-five tables. It calls subroutine TP420 to rank the concentrations.

TP380 -- Called by TP240, this subroutine prints the averaged results.

TP390 -- Called by TP240 to print the high-five tables if so specified by the user.

TP410 -- Subroutine called by TP340 to read the hourly records of the concentration file (FORTRAN unit 9). It begins with comments describing the record layout.

TP420 -- Subroutine called by subroutine TP370 to arrange concentrations of various averaging times into high-five tables. These tables are arrays which store the highest five concentrations for each receptor for each averaging time.

CHRON -- This subroutine, referenced by both TP240 and TP340, converts dates between 1960 and 1999 to a common sequential hour.

ICHRON -- Subroutine called by TP240 to convert a common sequential hour to a year, Julian day, and hour.

Figure 4 is a flow diagram of TUPOS-P showing its major loops and the relationships of the subroutines to each other.

## NON-STANDARD FEATURES

The PARAMETER statement, which is used in the TUPOS-P source code, is considered a non-standard FORTRAN feature. It allows constants to be referenced by symbolic names. This facilitates the updating of programs in which the only changes between compilations are in the values of certain constants. In TUPOS-P, the PARAMETER statement initializes the following constants:

NPTMAX -- maximum number of point sources,
NREMAX -- maximum number of receptors, and
NDMAX -- maximum number of meteorological file descriptor records.

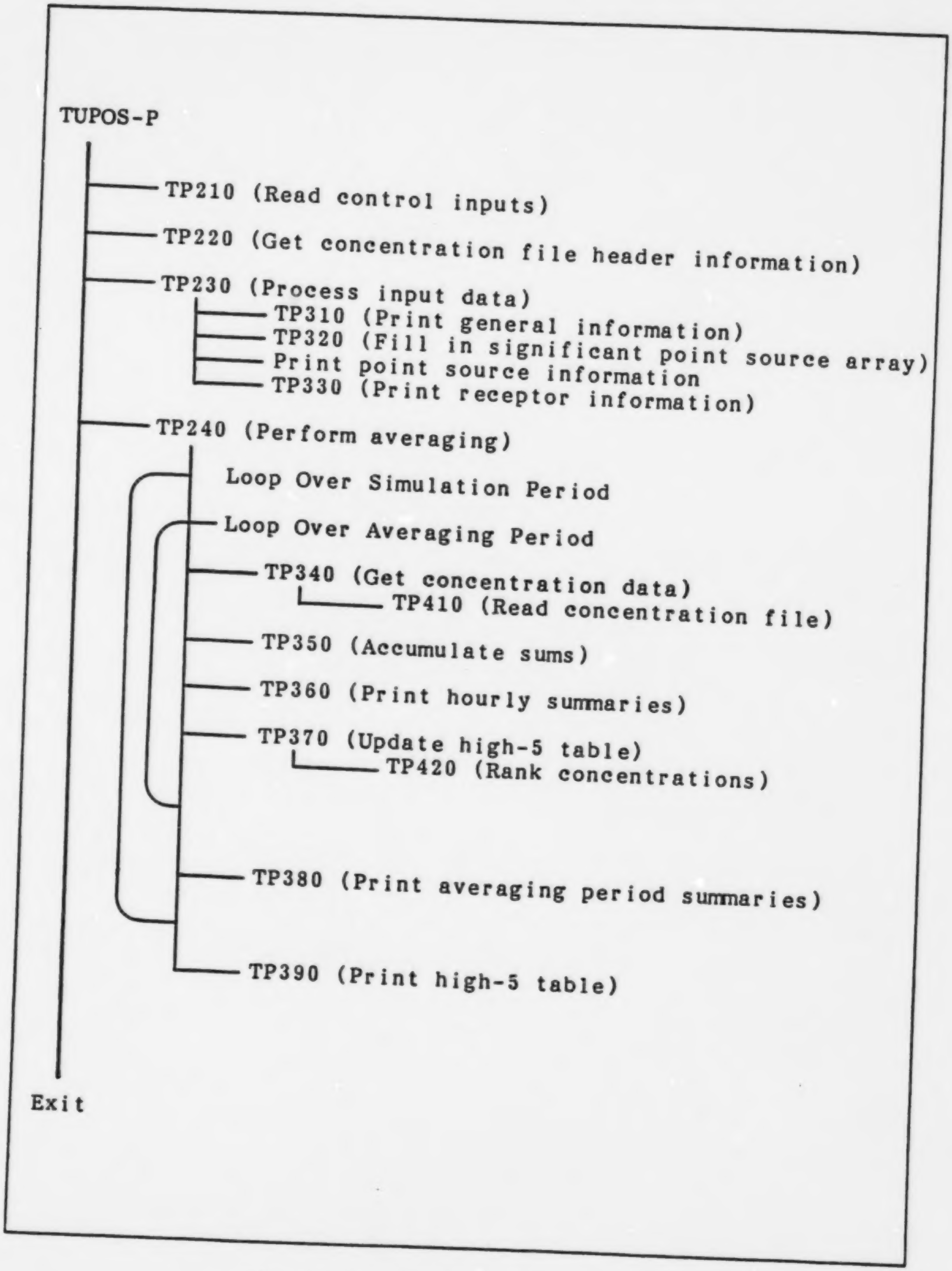

TUPOS-P
TP210 (Read control inputs)
TP220 (Get concentration file header information)
TP230 (Process input data)
TP310 (Print general information)
TP320 (Fill in significant point source array)
Print point source information
TP330 (Print receptor information)
TP240 (Perform averaging)
Loop Over Simulation Period
Loop Over Averaging Period
TP340 (Get concentration data)
TP410 (Read concentration file)
TP350 (Accumulate sums)
TP360 (Print hourly summaries)
TP370 (Update high-5 table)
TP420 (Rank concentrations)
TP380 (Print averaging period summaries)
TP390 (Print high-5 table)
Exit

Figure 4. TUPOS-P flow diagram.

These constants in turn are used to dimension numerous arrays. If the user's compiler does not support PARAMETER, the desired value of NPTMAX, NREMAX, and NDMAX must be hardcoded. The best way to do this is through global changes with an editor.

## SECTION 6

## INPUT DATA PREPARATION

### RECORD INPUT SEQUENCE

There are nine record types read by TUPOS-P; five of these are free format input. While the free format is simple to use, care should be taken to ensure that every variable is given a value in the correct order. Each variable should be separated by a comma and should conform to the variable name type. One of the nine record types is optional, depending on the options exercised on record type 6. A brief description of each input parameter is given in Table 3 with the appropriate units. Under the "Format" column of Table 3, FF represents free format.

TABLE 2. RECORD INPUT SEQUENCE FOR TUPOS-P

| Record type & Variable | Column | Format | Variable description | Units |
|---|---|---|---|---|
| Record type 1 | | | | |
| HEAD1 | 1-80 | 20A4 | 80-character title | -- |
| Record type 2 | | | | |
| HEAD2 | 1-80 | 20A4 | 80-character title | -- |

(continued)

TABLE 2 (continued)

| Record type & Variable | Column | Format | Variable description | Units |
|---|---|---|---|---|
| Record type 3 | | | | |
| HEAD3 | 1-80 | 20A4 | 80-character title | -- |
| Record type 4A | | | | |
| IYRS | --- | FF | 2-digit year for this summary | yr |
| IDYS | --- | FF | Starting Julian day for this summary | day |
| IHRS | --- | FF | Starting hour for this summary | hr |
| IHLIM | --- | FF | Total number of hours to be summarized | hr |
| IFILE | --- | FF | Concentration file indicator: 0 for hourly concentrations and 1 for partial concentrations | -- |
| NSIGP | --- | FF | Number of sources for which calculated contributions will be displayed | -- |
| Record type 4B | | | | |
| NPER | --- | FF | Number of periods to be run | -- |

(continued)

TABLE 2 (continued)

| Record type & Variable | Column | Format | Variable description | Units |
|---|---|---|---|---|
| NAVG | --- | FF | Number of hours in a period | hr |
| NAV5 | --- | FF | Additional averaging time for high-five table | hr |
| NVAL3 | --- | FF | Number of hours required to have a valid 3-hr period | hr |
| NVAL8 | --- | FF | Number of hours required to have a valid 8-hr period | hr |
| NVAL24 | --- | FF | Number of hours required to have a valid 24-hr period | hr |
| NVALX | --- | FF | Number of hours required to have a valid additional period of length NAV5 hours | hr |
| Record type 5 | | | | |
| JPOL | 1- 4 | A4 | 4-character pollutant name | -- |
| METID | 5-12 | 2A4 | 8-character identifier. Identical to METNAM in meteorological file. | -- |
| MDATAC | 13-18 | I6 | Year/month/day of data creation (6 digits) | -- |

(continued)

TABLE 2 (continued)

| Record type & Variable | Column | Format | Variable description | Units |
|---|---|---|---|---|
| MDATBC | 19-24 | I6 | Hour/minute/second of data creation (6 digits) | -- |
| Record type 6 -- Input and print options (1 = employ option; 0 = do not use option) | | | | |
| IOPS | --- | FF | Specify significant sources | -- |
| IOPDHC | --- | FF | Delete hourly contributions | -- |
| IOPDPC | --- | FF | Delete final plume height and distance to final rise on hourly contributions | -- |
| IOPDHS | --- | FF | Delete hourly summaries | -- |
| IOPDPH | --- | FF | Delete final plume height and distance to final rise summaries | -- |
| IOPDAC | --- | FF | Delete averaging-period contributions | -- |
| IOPDAS | --- | FF | Delete averaging-period summaries | -- |
| IOPDHI | --- | FF | Delete average concentrations and high-five tables | -- |

(continued)

TABLE 2 (continued)

| Record type & Variable | Column | Format | Variable description | Units |
|---|---|---|---|---|
| Record type 7 -- Optional (read only if IOPS = 1) | | | | |
| INPT | --- | FF | Number of user-specified significant sources | -- |
| MPS | --- | FF | Point source number of each user-specified significant source. There must be INPT of these. | -- |
| Record type 8 -- Additional summary period | | | | |
| IYRS | --- | FF | 2-digit year for summary | yr |
| IDYS | --- | FF | Starting Julian day for summary | day |
| IHRS | --- | FF | Starting hour for summary | hr |
| IHLIM | --- | FF | Total number of hours to be summarized | hr |

## INTRICACIES OF THE DATA

Most of the input data listed above are straightforward. However, there are some input variables which require additional explanation to ensure proper assignment of values.

### Record Type 4A

The starting date must be within the period January 1, 1960 to December 31, 1999. Dates outside this range result in program termination. IYRS is a 2-digit year, that is, if the starting year is 1984, then IYRS = 84. IHRS is a 2-digit starting hour between 1 and 24.

IFILE is the concentration file indicator: 0 for hourly concentrations and 1 for partial concentrations. An hourly concentration file consists of hourly total concentrations for each receptor, while the partial concentration file consists of hourly contributions from each source to each receptor. If the user desires contribution output (i.e., IOPDHC = 0 and/or IOPDAC = 0), then IFILE must be set to one and a partial concentration file must be assigned to FORTRAN unit 9.

The variable NSIGP is specified primarily to obtain printed information on concentration contributions at each receptor from up to 25 individual sources. The value entered is the number of sources for which contributions are printed for each hour (if IOPDHC = 0) and for each averaging period (if IOPDAC = 0).

### Record Type 4B

TUPOS-P optionally provides hourly concentration summaries (see Record Type 6 below). In addition concentration estimates may be provided over a user-specified length of NAVG hours. NPER is the number of these averaging periods in the simulation. For example, if a 3-day simulation with 24-hour averages is desired, then NPER and NAVG are 3 and 24, respectively.

High-five tables are automatically produced for 1-, 3-, 8-, and 24-hour averaging times, therefore none of these values should be used for NAV5. Also, the value entered for NAV5 should be evenly divisible into 24; thus only 2-, 4-, 6-, and 12-hour averaging times meet all these criteria and may be used for NAV5.

NVAL3, NVAL8, NVAL24, and NVALX are the number of hours required to have a valid 3-, 8-, 24-, and NAV5-hour period. For instance, the user may decide that 20 hours of concentration data are sufficient to estimate the 24-hour average. Thus NAV24 would be set equal to 20. The 3-, 8-, and NAV5-hour periods may be set in a similar manner. Note that for the example problem these values are set at ridiculously low values of 1, 4, 12, and 6 in order that concentration values will appear in a number of the output tables. In general use, it is the authors' opinion that in order to have a valid average concentation for a period, on the order of 75 to 80 percent of the hours in the period should have valid concentration estimates.

Record Type 5

JPOL is a 4-character pollutant name abbreviation used to label output. METID, MDATAC, MDATBC are compared with variables METNAM, MDATA, and MDATB, respectively, which are read from the concentration file (FORTRAN unit 9). For a complete listing of the variables included in the records on the concentrtion files, see pages 78 through 81 in Turner et al. (1986). This is done to assure that the proper concentration file is used for the summary. If the variables do not match, then execution is terminated.

Record Type 6

To employ a particular option a one is entered on input; otherwise a zero is entered. The options are described briefly next.

IOPS -- With IOPS = 1, an additional input record is read (i.e., record type 7), which indicates how many sources are specified as significant and their corresponding source numbers.

IOPDHC -- If IOPDHC = 0, then hourly contribution summaries are provided. These consist of significant source contributions and total concentrations at each receptor for each hour of the summary. Output volume due to this option can range from 1 to 12 pages per hour of simulation depending on the number of receptors and significant sources. If NSIGP equals zero, then IOPDHC is automatically set to one. One cannot get both hourly contributions and hourly summaries (i.e., IOPDHC and IOPDHS cannot both equal zero) in a single execution. If IOPDHS is zero, then IOPDHC must be set to one. Also, if hourly contributions are requested (i.e., IOPDHC = 0), then a partial concentration file must be attached to FORTRAN unit 9.

IOPDPC -- If IOPDPC = 0, then the final effective plume height and distance to final rise are provided for each source in the hourly contribution summaries.

IOPDHS -- When IOPDHS = 0, hourly summaries are provided. These consist of total hourly concentrations at each receptor. Output volume due to this option can range from 1 to 4 pages per 12-hours of simulation depending on the number of receptors. One cannot get both hourly summaries and hourly contributions (i.e., IOPDHS and IOPDHC cannot both equal zero) in a single execution. If IOPDHC is zero, then IOPDHS must be set to one.

IOPDPH -- If IOPDPH = 0, then the final effective plume height and distance to final rise are provided for each source.

IOPDAC -- When IOPDAC = 0, contributions from significant sources are provided for each averaging period. Output volume due to this option can range from 1 to 12 pages per averaging period depending on the number of receptors and significant sources. If NSIGP equals zero, then IOPDAC is automatically set to one.

IOPDAS -- If IOPDAS = 0, then summaries for each averaging period are provided. Output volume due to this option can range from 1 to 4 pages per averaging period depending on the number of receptors. It would be wasteful to get both averaging period contributions and averaging period summaries since they provide essentially the same information. If IOPDAC is zero, then IOPDAS should be set to one.

IOPDHS -- High-five tables are provided when IOPDHS = 0.

Record Type 7

This record is read only when IOPS = 1. INPT is the number of user-specified significant sources and MPS is an array containing INPT source numbers. The user is referred to the original TUPOS output for the appropriate source numbers. If INPT is less than NSIGP, then the significant source array is filled from the ranked source list (see appropriate TUPOS output). An example should help clarify the process.

Consider an application having 10 sources, where a run is deemed useful that shows contributions from 5 sources. Specifically, the contributions from sources 1 and 10 are desired. So far, NSIGP is 5, INPT is 2, and array MPS contains source numbers 1 and 10. Suppose the order of significance of the 10 sources is as follows: 1, 10, 2, 9, 3, 8, 4, 7, 5, and 6. The three remaining positions in the significant source list are filled with source numbers: 2, 9, and 3.

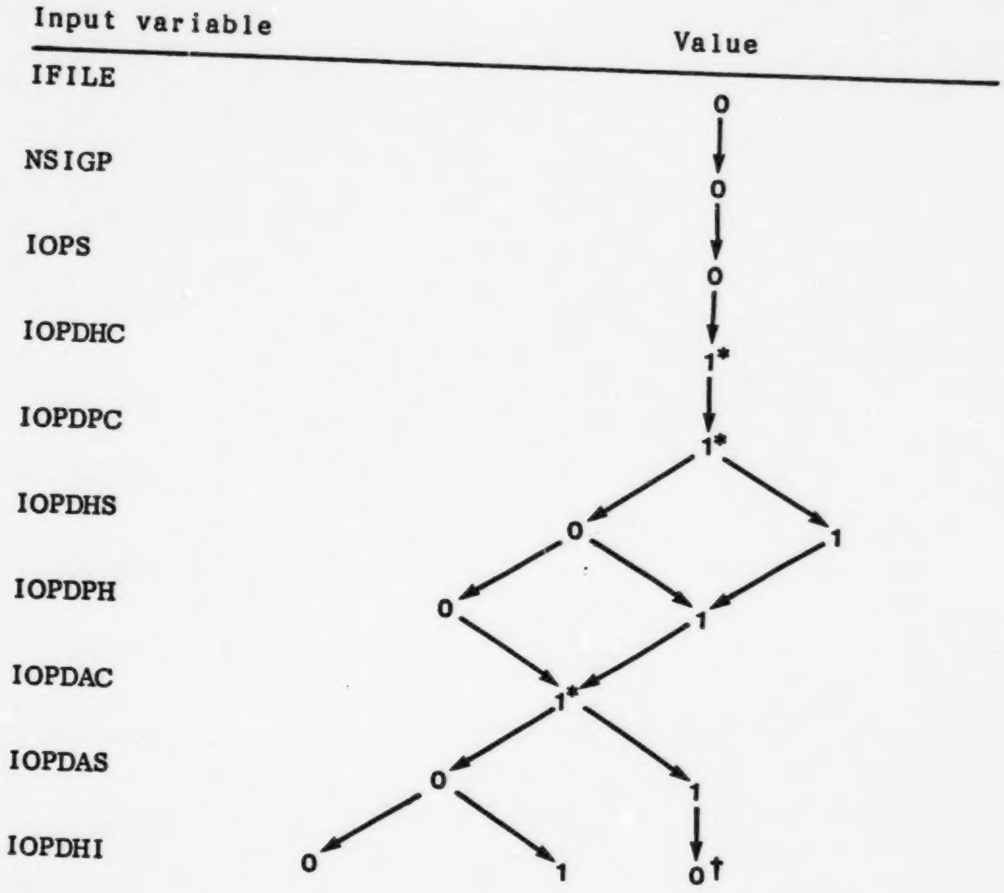
### Record Type 8

Additional time periods may be analyzed on a particular run by including one of these record types for each additional summary period. It should be noted that all other control information remains fixed. An example might be helpful.

Suppose IYRS, IDYS, IHRS, and IHLIM on record type 4A are initialized as follows: 85, 1, 1, and 24. Thus the first summary is for the first day of 1985. If the user also wants to analyze the 30th day of 1985, then a record type 8 must be included with the variables IYRS, IDYS, IHRS, and IHLIM on record type 8 defined as follows: 85, 30, 1, and 24. It is important to note that the additional summary periods cannot go backward in time.

## PROPER ASSIGNMENT OF INTERRELATED VARIABLES

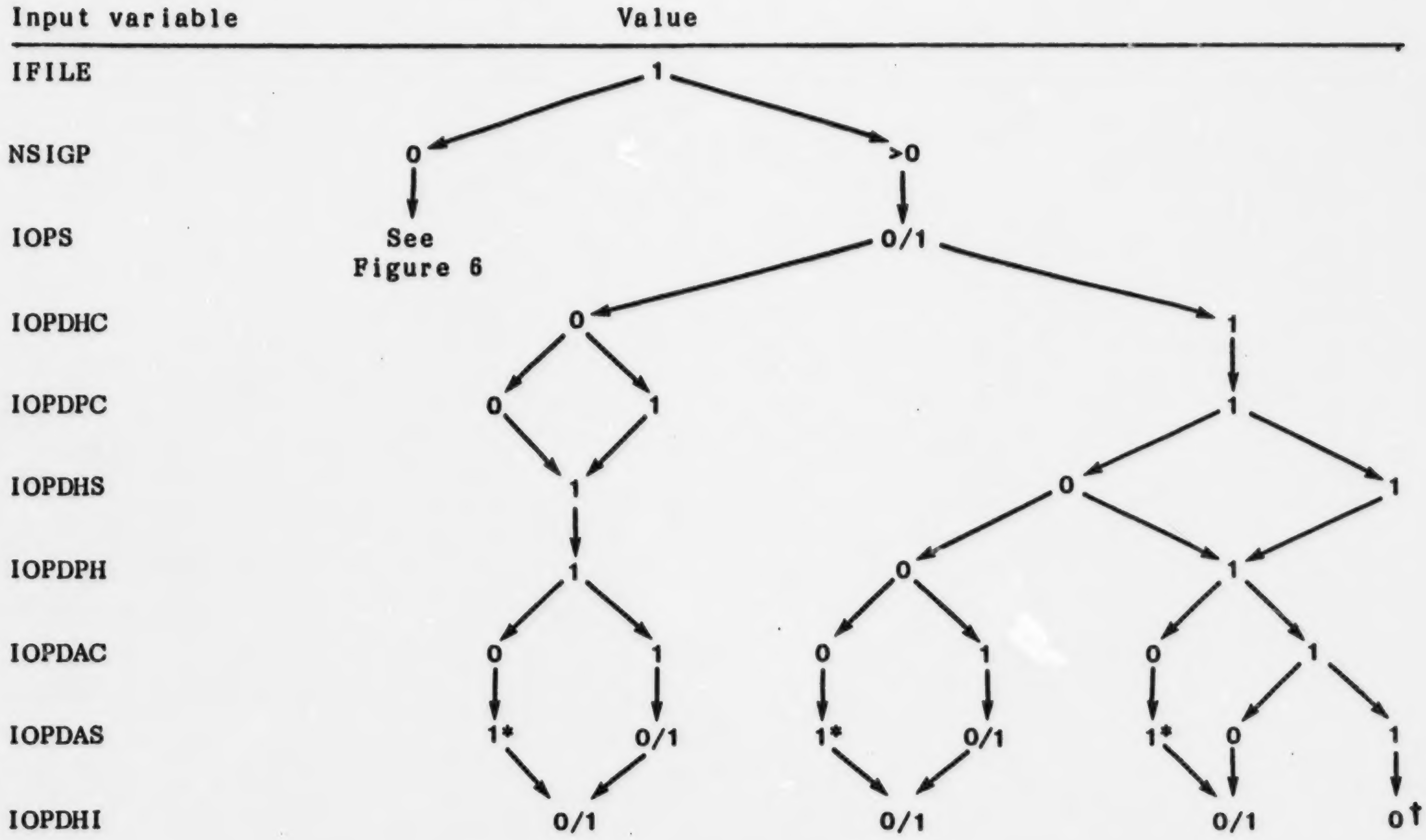
The assignment of many of the input variables depends on whether the concentration file consists of hourly or partial concentrations. For instance, the user cannot get partial contribution output if an hourly concentration file is being read (i.e., if IFILE = 0, then IOPDHC and IOPDAC must both be set to one). Also, many of the input parameters are interrelated and depend on values of other variables. For example, the user cannot get both hourly summaries and hourly contributions (i.e., IOPDHS and IOPDHC cannot both equal zero) in a single execution. Figures 5 and 6 are provided to assist the user in the proper assignment of these interrelated variables. A singular path in the figures indicates the only possible or logical value for the variable or option given the prior choices. If the user tries to assign a value other than that specified in the figure, an error message is printed and the program terminates (exceptions to this outcome are noted in the figures). A valid user choice is represented by a "0/1" or a dual path.


Input variable
Value
IFILE
NSIGP
IOPS
IOPDHC
IOPDPC
IOPDHS
IOPDPH
IOPDAC
IOPDAS
IOPDHI
0
0
0
1*
1*
0
1
0
1
1*
0
1
0
1
0†

* Set within program regardless of user-supplied value.

† Recommended choice (if chosen otherwise, no concentration output would be provided).

Figure 5. Proper assignment of input variables when an hourly concentration file is to be read.


Input variable
Value
IFILE
NSIGP
IOPS
IOPDHC
IOPDPC
IOPDHS
IOPDPH
IOPDAC
IOPDAS
IOPDHI
1
0
>0
See Figure 6
0/1
0
1
0
1
1
1
0
1
1
0
1
0
1
0
1
0
1
1*
0/1
1*
0/1
1*
0
1
0/1
0/1
0/1
0†

* Recommended choice to avoid redundant output.

† Recommended choice (if chosen otherwise, no concentration output would result).

Figure 6. Proper assignment of input variables when a partial concentration file is to be read.

# SECTION 7

# EXECUTION OF THE POSTPROCESSOR AND SAMPLE TEST

## EXECUTION

TUPOS-P produces an error-free compile on UNIVAC EXEC 8 and IBM MVS computers with comparable execution results. A sample job stream is presented below.

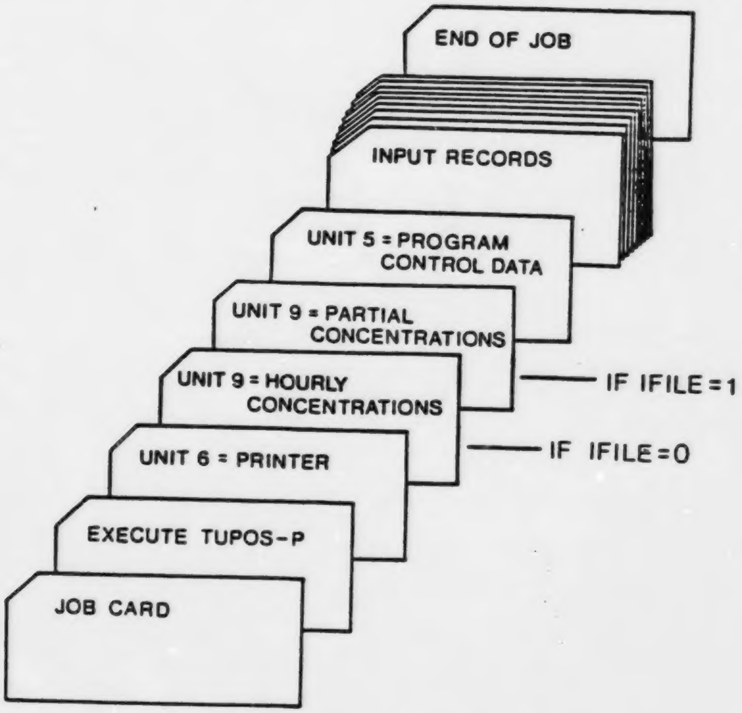

END OF JOB
INPUT RECORDS
UNIT 5 = PROGRAM CONTROL DATA
UNIT 9 = PARTIAL CONCENTRATIONS
IF IFILE=1
UNIT 9 = HOURLY CONCENTRATIONS
IF IFILE=0
UNIT 6 = PRINTER
EXECUTE TUPOS-P
JOB CARD

Figure 7. Sample job stream for TUPOS-P.

A job stream for a UNIVAC EXEC 8 system might have the following form:

```
@RUN,R/R JOB-ID,ETC
@ASG,A MODELS*LOAD.
@ASG,A CONC.
@USE 9,CONC.
@XQT MODELS*LOAD.TUPOSP
(input records shown in Table 4)
@FIN
```

The following is a sample job stream for an IBM system under OS or MVS. Unit 9 is assumed to have been preallocated.

```
//JOBID    JOB  (PROJ,ACCT,OTHER),CLASS=A,TIME=1
//XTUPOSP  EXEC PGM=TUPOSP,TIME=(,30)
//STEPLIB  DD   DSN=USER.MODELS.LOAD,DISP=SHR
//FT09F001 DD   DSN=USER.CONC.DATA,DISP=SHR
//FT06F001 DD   SYSOUT=A
//FT05F001 DD   *
(input records shown in Table 4)
/*
//
```

## SAMPLE TEST

The example problem discussed in Section 4 is used for model verification. Assign the partial concentration file generated by executing the sample test in the TUPOS user's guide (Turner et al., 1986) to FORTRAN unit 9. The input data for program verification are given in Table 3. Annotated output for the example problem is shown in Figure 8. Users may verify the proper execution of the program by comparing their results with those given in the figure.

## TABLE 3. INPUT DATA FOR THE SAMPLE TEST

```
=========================================================================================
Record
                                                                                  Record
------------------------------------------------------------------------------------Type
Data column position
         1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
=========================================================================================

TEST OF TUPOS-P USING PARTIAL CONCENTRATION FILE CREATED BY TUPOS TEST 9            1

THREE SOURCES WITH BID.                                                              2

USES 24-HOUR SYNTHETIC DATA SET.                                                     3

83,365,15,24,1,3                                                                    4A

1,24,12,1,4,12,6                                                                    4B

 S02SET6    840210105523                                                             5

1,0,0,1,1,0,0,0                                                                      6

3,1,2,3                                                                              7
-----------------------------------------------------------------------------------------
Data column position
         1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
=========================================================================================
```

If the user does not require the detail provided by the hourly contribution tables (see pages 35, 36, and 37), hourly summaries may instead be requested (i.e., IOPDHS = 0 and IOPDPH = 0). Figure 9 shows the hourly concentration summaries (plus plume information) for the above-mentioned example problem. If the user wishes to obtain similiar output the following changes must be made to the input data in Table 3:

IOPDHC = 1,
IOPDPC = 1,
IOPDHS = 0, and
IOPDPH = 0,

that is, record type 6 should read: 1,1,1,0,0,0,0,0.

```
                  TUPOS-P-1.0  (VERSION 85092)
                  A POSTPROCESSOR IN
                  SECTION 2.  NON-GUIDELINE MODELS
                  IN UNAMAP (VERSION 6) JUL 86
                  SOURCE: UNAMAP FILE ON EPA'S UNIVAC 1110, RTP, NC.

TITLE:   TEST OF TUPOS-P USING PARTIAL CONCENTRATION FILE CREATED BY TUPOS TEST 9.
         THREE SOURCES WITH BID.
         USES 24-HOUR SYNTHETIC DATA SET.

TITLE OF TUPOS SIMULATION:  TUPOS TEST 9.
                            THREE SOURCES WITH BID.
                            USES 24-HOUR SYNTHETIC DATA SET.

MET FILE IDENTIFIER:  SET6
CREATED:  840210 (YR MO DAY)     105523 (HR MIN SEC)
DESCRIPTION:  SYNTHETIC DATA SET WITH HOURS MISSING AND DATA MISSING.
              DATA AVAILABLE FOR HOURS 15,16,17,21,22,23,02,03,04,07,08,09, AND 14.
              NO DATA FOR HOURS 18,19,20,24,01,05,06,10,11,12, AND 13.
              HOUR 21 HAS ONLY 3 LEVELS.  SOME TEMPERATURES ARE MISSING FOR HOUR 02.
              VARIATION APPROXIMATES A CLEAR DAY AND NIGHT.

                      * * * GENERAL INPUT INFORMATION * * *

THIS SIMULATION FOR THE POLLUTANT  SO2 BEGINS AT YEAR: 1983   JULIAN DAY: 365   HOUR: 15 AND IS FOR    24 HOURS.
A FACTOR OF 1.000000+000 HAS BEEN SPECIFIED TO CONVERT USER LENGTH UNITS TO KILOMETERS.
FOR THIS SIMULATION   3 SIGNIFICANT SOURCES ARE TO BE CONSIDERED.
THIS SIMULATION WILL CONSIDER   1  24-HOUR PERIODS.
THIS SIMULATION WILL NOT CONSIDER ANY POLLUTANT LOSS.
HIGH-FIVE SUMMARY CONCENTRATION TABLES WILL BE OUTPUT FOR   5 AVERAGING PERIODS.
AVERAGING TIMES OF 1,3,8, AND 24 HOURS ARE AUTOMATICALLY DISPLAYED.
THE FOLLOWING NUMBER OF HOURS ARE REQUIRED FOR A VALID PERIOD IN THE HI-5 TABLE: 1 FOR 3-HR, 4 FOR 8-HR, AND 12 FOR 24-HR.
THE ADDITIONAL AVERAGING PERIOD OF 12 HRS WILL ALSO BE DISPLAYED.
THERE MUST BE   6 HRS OF VALID DATA TO CONSIDER PERIOD VALID FOR HI-5 TABLE.

OPTION SPECIFICATION (1 = EMPLOY OPTION; 0 = DO NOT USE OPTION.)
OPTION        MEANING

             TECHNICAL OPTIONS
IOPT      0   USE TERRAIN ADJUSTMENTS.
IOPB      1   USE BUOYANCY-INDUCED DISPERSION.
IOPD      0   NO STACK DOWNWASH.
IOPG      1   NO GRADUAL PLUME RISE.
IOPM      0   TEST AGAINST MIXING AT NIGHT.

             INPUT OPTIONS
IOPQ      0   READ HOURLY EMISSIONS.
IOPS      1   SPECIFY SIGNIFICANT SOURCES.
IOPR      1   INPUT RADIAL DISTANCES AND GENERATE POLAR COORDINATE RECEPTORS.

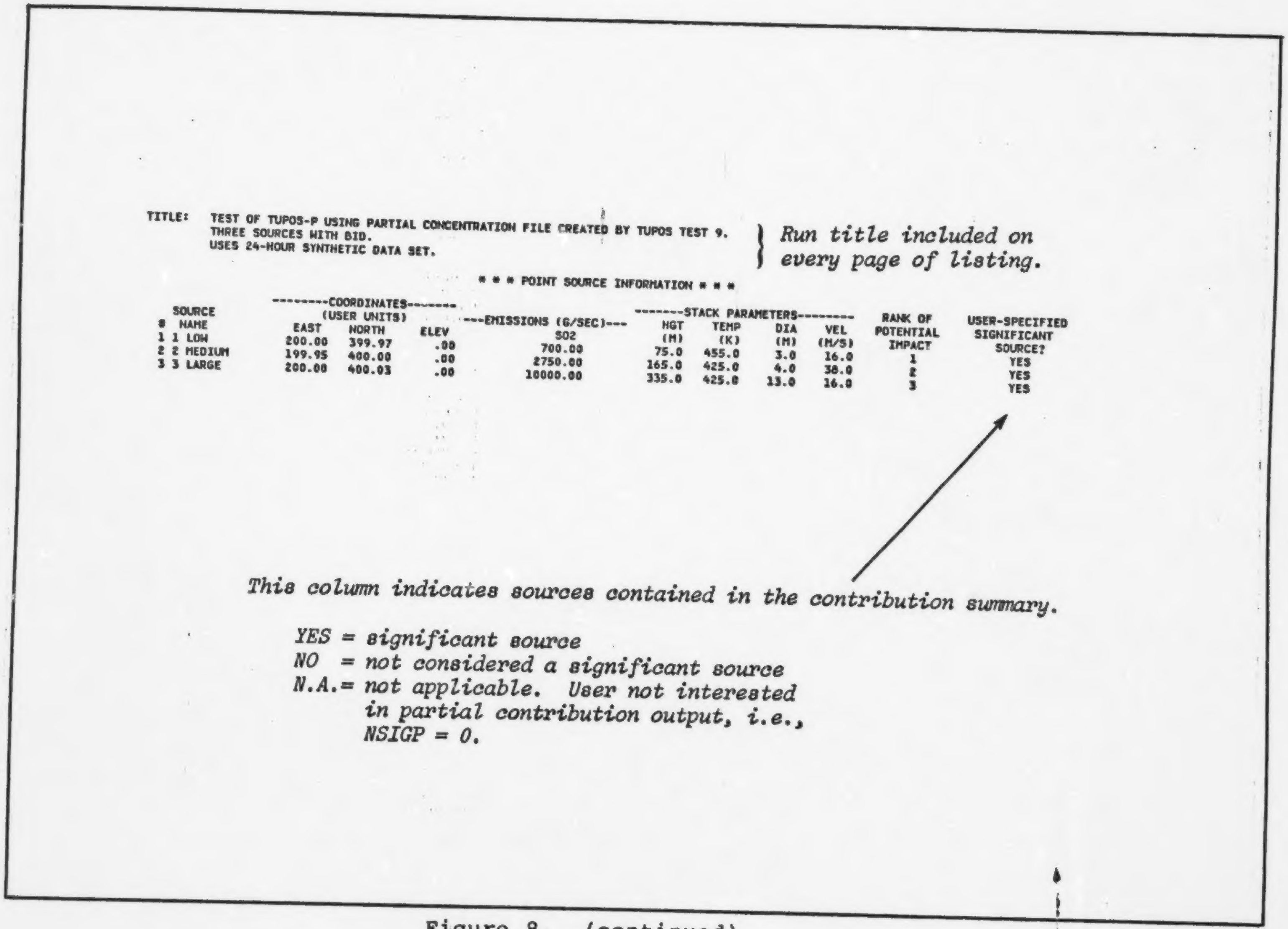
             PRINTED OUTPUT OPTIONS
IOPDHC    0   DELETE HOURLY CONTRIBUTIONS.
IOPDPC    0   DELETE FINAL PLUME HEIGHT AND DISTANCE TO FINAL RISE ON HOURLY CONTRIBUTIONS.
IOPDHS    1   DELETE HOURLY SUMMARY.
IOPDPH    1   DELETE FINAL PLUME HEIGHT AND DISTANCE TO FINAL RISE ON HOURLY SUMMARY.
IOPDAC    0   DELETE AVERAGING-PERIOD CONTRIBUTIONS.
IOPDAS    0   DELETE AVERAGING-PERIOD SUMMARY.
IOPDHI    0   DELETE AVERAGE CONCENTRATIONS AND HIGH-FIVE TABLE.
```

*Three line run title*

*Title of TUPOS simulation used to generate the concentration file.*

*Information regarding meteorology file used in generating the concentration file.*

Figure 8.  Annotated output for the sample test.



```
TITLE:   TEST OF TUPOS-P USING PARTIAL CONCENTRATION FILE CREATED BY TUPOS TEST 9.
         THREE SOURCES WITH BID.
         USES 24-HOUR SYNTHETIC DATA SET.

                                      * * * POINT SOURCE INFORMATION * * *

                  --------COORDINATES-------                               -------STACK PARAMETERS--------
   SOURCE              (USER UNITS)          ---EMISSIONS (G/SEC)---     HGT     TEMP     DIA     VEL     RANK OF      USER-SPECIFIED
 #  NAME            EAST     NORTH    ELEV             SO2               (M)      (K)     (M)    (M/S)   POTENTIAL     SIGNIFICANT
                                                                                                          IMPACT        SOURCE?
 1 1 LOW          200.00    399.97     .00            700.00             75.0    455.0     3.0    16.0       1             YES
 2 2 MEDIUM       199.95    400.00     .00           2750.00            165.0    425.0     4.0    38.0       2             YES
 3 3 LARGE        200.00    400.03     .00          10000.00            335.0    425.0    13.0    16.0       3             YES
```

*Run title included on every page of listing.*

*This column indicates sources contained in the contribution summary.*

*YES = significant source*
*NO = not considered a significant source*
*N.A.= not applicable. User not interested in partial contribution output, i.e., NSIGP = 0.*

Figure 8. (continued).

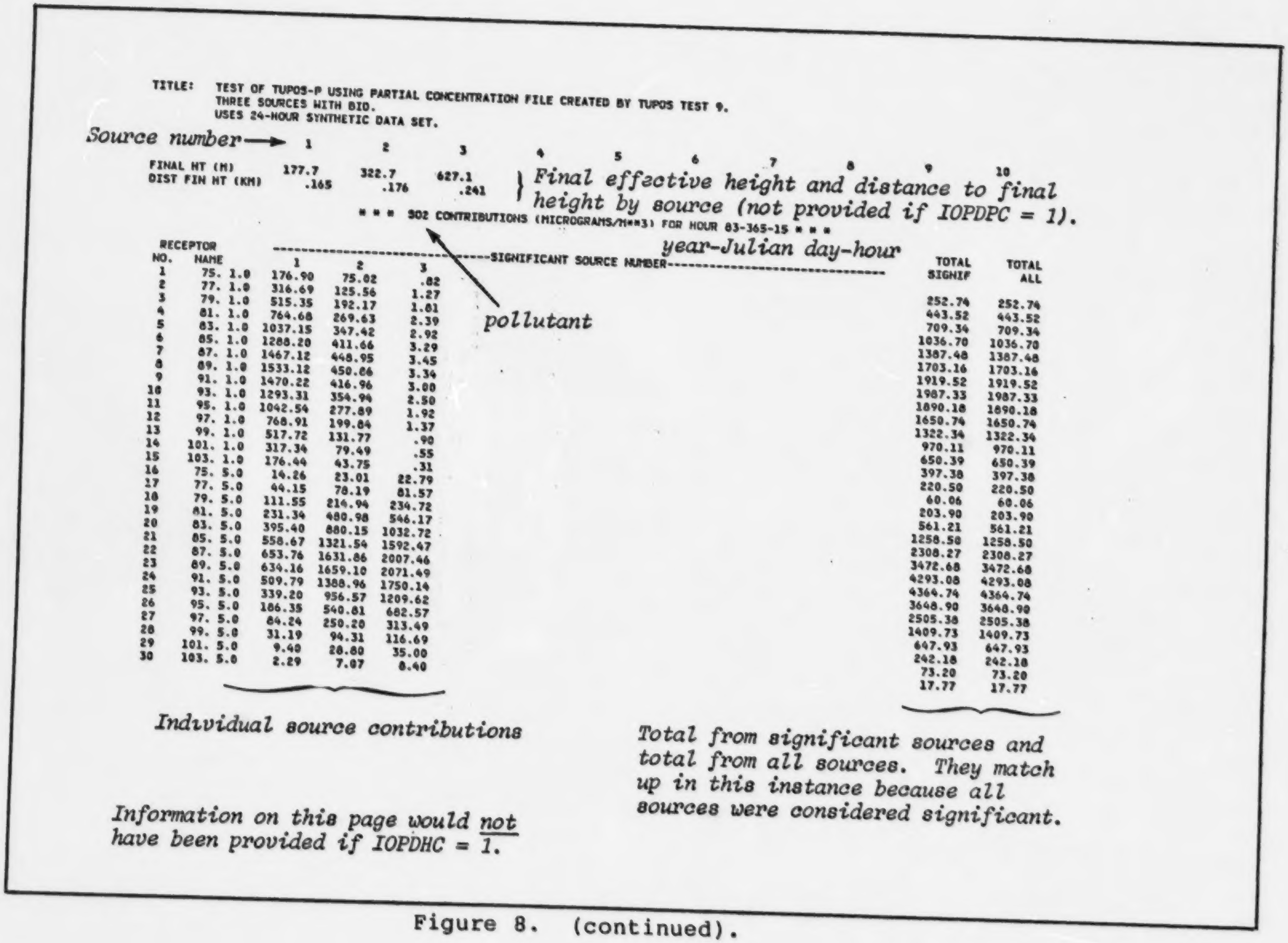
```
TITLE:   TEST OF TUPOS-P USING PARTIAL CONCENTRATION FILE CREATED BY TUPOS TEST 9.
         THREE SOURCES WITH BID.
         USES 24-HOUR SYNTHETIC DATA SET.

                          * * * RECEPTOR INFORMATION * * *

RECEPTOR    IDENTIFICATION     ------------COORDINATES------------     HEIGHT ABOVE
                                         (USER UNITS)                  LOCAL GRD-LVL
                                   EAST       NORTH        ELEV            (M)
    1            75. 1.0          200.97     400.26         .00            .00
    2            77. 1.0          200.97     400.22         .00            .00
    3            79. 1.0          200.98     400.19         .00            .00
    4            81. 1.0          200.99     400.16         .00            .00
    5            83. 1.0          200.99     400.12         .00            .00
    6            85. 1.0          201.00     400.09         .00            .00
    7            87. 1.0          201.00     400.05         .00            .00
    8            89. 1.0          201.00     400.02         .00            .00
    9            91. 1.0          201.00     399.98         .00            .00
   10            93. 1.0          201.00     399.95         .00            .00
   11            95. 1.0          201.00     399.91         .00            .00
   12            97. 1.0          200.99     399.88         .00            .00
   13            99. 1.0          200.99     399.84         .00            .00
   14           101. 1.0          200.98     399.81         .00            .00
   15           103. 1.0          200.97     399.78         .00            .00
   16            75. 5.0          204.83     401.29         .00            .00
   17            77. 5.0          204.87     401.12         .00            .00
   18            79. 5.0          204.91     400.95         .00            .00
   19            81. 5.0          204.94     400.78         .00            .00
   20            83. 5.0          204.96     400.61         .00            .00
   21            85. 5.0          204.98     400.44         .00            .00
   22            87. 5.0          204.99     400.26         .00            .00
   23            89. 5.0          205.00     400.09         .00            .00
   24            91. 5.0          205.00     399.91         .00            .00
   25            93. 5.0          204.99     399.74         .00            .00
   26            95. 5.0          204.98     399.56         .00            .00
   27            97. 5.0          204.96     399.39         .00            .00
   28            99. 5.0          204.94     399.22         .00            .00
   29           101. 5.0          204.91     399.05         .00            .00
   30           103. 5.0          204.87     398.88         .00            .00

NOTE:  THE TERRAIN OPTION, IOPT, IS NOT BEING USED FOR THIS RUN AND
       GROUND-LEVEL ELEVATIONS (STACK OR RECEPTOR) GIVEN ON INPUT ARE IGNORED.
```

Figure 8.   (continued).



```
TITLE:   TEST OF TUPOS-P USING PARTIAL CONCENTRATION FILE CREATED BY TUPOS TEST 9.
         THREE SOURCES WITH BID.
         USES 24-HOUR SYNTHETIC DATA SET.
                         1          2          3          4          5          6          7          8          9         10
  FINAL HT (M)         177.7      322.7      627.1
  DIST FIN HT (KM)        .165       .176       .241

                         * * *  SO2 CONTRIBUTIONS (MICROGRAMS/M**3) FOR HOUR 83-365-15 * * *

   RECEPTOR        ---------------------------------SIGNIFICANT SOURCE NUMBER-------------------------------     TOTAL      TOTAL
  NO.    NAME           1          2          3                                                                 SIGNIF       ALL
   1       75. 1.0   176.90      75.02        .82                                                              252.74     252.74
   2       77. 1.0   316.69     125.56       1.27                                                              443.52     443.52
   3       79. 1.0   515.35     192.17       1.81                                                              709.34     709.34
   4       81. 1.0   764.68     269.63       2.39                                                             1036.70    1036.70
   5       83. 1.0  1037.15     347.42       2.92                                                             1387.48    1387.48
   6       85. 1.0  1288.20     411.66       3.29                                                             1703.16    1703.16
   7       87. 1.0  1467.12     448.95       3.45                                                             1919.52    1919.52
   8       89. 1.0  1533.12     450.86       3.34                                                             1987.33    1987.33
   9       91. 1.0  1470.22     416.96       3.00                                                             1890.18    1890.18
  10       93. 1.0  1293.31     354.94       2.50                                                             1650.74    1650.74
  11       95. 1.0  1042.54     277.89       1.92                                                             1322.34    1322.34
  12       97. 1.0   768.91     199.84       1.37                                                              970.11     970.11
  13       99. 1.0   517.72     131.77        .90                                                              650.39     650.39
  14      101. 1.0   317.34      79.49        .55                                                              397.38     397.38
  15      103. 1.0   176.44      43.75        .31                                                              220.50     220.50
  16       75. 5.0    14.26      23.01      22.79                                                               60.06      60.06
  17       77. 5.0    44.15      78.19      81.57                                                              203.90     203.90
  18       79. 5.0   111.55     214.94     234.72                                                              561.21     561.21
  19       81. 5.0   231.34     480.98     546.17                                                             1258.50    1258.50
  20       83. 5.0   395.40     880.15    1032.72                                                             2308.27    2308.27
  21       85. 5.0   558.67    1321.54    1592.47                                                             3472.68    3472.68
  22       87. 5.0   653.76    1631.86    2007.46                                                             4293.08    4293.08
  23       89. 5.0   634.16    1659.10    2071.49                                                             4364.74    4364.74
  24       91. 5.0   509.79    1388.96    1750.14                                                             3648.90    3648.90
  25       93. 5.0   339.20     956.57    1209.62                                                             2505.38    2505.38
  26       95. 5.0   186.35     540.81     682.57                                                             1409.73    1409.73
  27       97. 5.0    84.24     250.20     313.49                                                              647.93     647.93
  28       99. 5.0    31.19      94.31     116.69                                                              242.18     242.18
  29      101. 5.0     9.40      28.80      35.00                                                               73.20      73.20
  30      103. 5.0     2.29       7.07       8.40                                                               17.77      17.77
```

*Source number* →

} *Final effective height and distance to final height by source (not provided if IOPDPC = 1).*

*pollutant*

*year-Julian day-hour*

*Individual source contributions*

*Total from significant sources and total from all sources. They match up in this instance because all sources were considered significant.*

*Information on this page would* *__not__* *have been provided if IOPDHC =* *__1.__*

Figure 8. (continued).

```
TITLE:   TEST OF TUPOS-P USING PARTIAL CONCENTRATION FILE CREATED BY TUPOS TEST 9.
         THREE SOURCES WITH BID.
         USES 24-HOUR SYNTHETIC DATA SET.

                      1         2         3         4         5         6         7         8         9        10

FINAL HT (M)        174.2     336.6     644.2
DIST FIN HT (KM)      .155      .200      .263

                          * * *  SO2 CONTRIBUTIONS (MICROGRAMS/M**3) FOR HOUR 83-365-16 * * *

 RECEPTOR         ------------------------------SIGNIFICANT SOURCE NUMBER------------------------------     TOTAL     TOTAL
NO.   NAME           1        2         3                                                                   SIGNIF       ALL
 1     75. 1.0     87.79    10.86       .02
 2     77. 1.0    172.89    19.24       .03                                                                  98.67     98.67
 3     79. 1.0    305.02    30.86       .05                                                                 192.16    192.16
 4     81. 1.0    483.84    44.93       .06                                                                 335.93    335.93
 5     83. 1.0    692.04    59.46       .08                                                                 528.83    528.83
 6     85. 1.0    894.42    71.65       .09                                                                 751.58    751.58
 7     87. 1.0   1046.14    78.66       .09                                                                 966.15    966.15
 8     89. 1.0   1108.24    78.72       .09                                                                1124.89   1124.89
 9     91. 1.0   1063.56    71.82       .08                                                                1187.05   1187.05
10     93. 1.0    924.26    59.70       .06                                                                1135.46   1135.46
11     95. 1.0    726.51    45.18       .05                                                                 984.02    984.02
12     97. 1.0    515.66    31.09       .03                                                                 771.74    771.74
13     99. 1.0    329.68    19.41       .02                                                                 546.78    546.78
14    101. 1.0    189.26    10.98       .01                                                                 349.12    349.12
15    103. 1.0     97.16     5.60       .01                                                                 200.25    200.25
16     75. 5.0      8.75    12.42      9.31                                                                 102.78    102.78
17     77. 5.0     32.61    50.29     36.15                                                                  30.49     30.49
18     79. 5.0     96.23   159.61    110.67                                                                 119.06    119.06
19     81. 5.0    226.22   399.76    268.89                                                                 366.51    366.51
20     83. 5.0    425.80   794.24    521.04                                                                 894.87    894.87
21     85. 5.0    643.95  1256.59    808.26                                                                1741.09   1741.09
22     87. 5.0    784.28  1587.17   1006.12                                                                2708.80   2708.80
23     89. 5.0    770.03  1602.51   1006.25                                                                3377.57   3377.57
24     91. 5.0    609.39  1293.46    808.61                                                                3378.78   3378.78
25     93. 5.0    388.19   833.63    521.52                                                                2711.46   2711.46
26     95. 5.0    198.52   427.96    269.33                                                                1743.33   1743.33
27     97. 5.0     81.18   174.35    110.99                                                                 895.81    895.81
28     99. 5.0     26.41    56.09     36.32                                                                 366.52    366.52
29    101. 5.0      6.79    14.15      9.38                                                                 118.82    118.82
30    103. 5.0      1.37     2.78      1.90                                                                  30.32     30.32
                                                                                                              6.04      6.04
```

Figure 8. (continued).

```
TITLE:   TEST OF TUPOS-P USING PARTIAL CONCENTRATION FILE CREATED BY TUPOS TEST 9.
         THREE SOURCES WITH BID.
         USES 24-HOUR SYNTHETIC DATA SET.

                        1          2          3          4          5          6          7          8          9          10

FINAL HT (M)         186.6      331.7      635.2
DIST FIN HT (KM)        .183       .191       .251

                          * * *  SO2 CONTRIBUTIONS (MICROGRAMS/M**3) FOR HOUR 83-365-17 * * *

 RECEPTOR                                                                                                  TOTAL      TOTAL
NO.   NAME        ------------------------------SIGNIFICANT SOURCE NUMBER------------------------------   SIGNIF       ALL
                       1          2          3
 1      75. 1.0    11.48        .55        .00                                                             12.03      12.03
 2      77. 1.0    26.43       1.09        .00                                                             27.52      27.52
 3.     79. 1.0    53.68       1.93        .00                                                             55.61      55.61
 4      81. 1.0    96.63       3.08        .00                                                             99.70      99.70
 5      83. 1.0   154.68       4.42        .00                                                            159.10     159.10
 6      85. 1.0   220.80       5.73        .00                                                            226.53     226.53
 7      87. 1.0   281.66       6.71        .00                                                            288.38     288.38
 8      89. 1.0   321.48       7.12        .00                                                            328.60     328.60
 9      91. 1.0   328.51       6.83        .00                                                            335.34     335.34
10      93. 1.0   300.56       5.92        .00                                                            306.48     306.48
11      95. 1.0   246.01       4.65        .00                                                            250.66     250.66
12      97. 1.0   179.90       3.29        .00                                                            183.19     183.19
13      99. 1.0   117.28       2.10        .00                                                            119.38     119.38
14     101. 1.0    67.97       1.21        .00                                                             69.18      69.18
15     103. 1.0    34.89        .62        .00                                                             35.51      35.51
16      75. 5.0     1.86       2.82        .69                                                              5.37       5.37
17      77. 5.0     9.72      14.59       3.38                                                             27.69      27.69
18      79. 5.0    38.84      57.84      12.85                                                            109.53     109.53
19      81. 5.0   119.63     177.37      38.16                                                            335.15     335.15
20      83. 5.0   285.67     423.42      89.15                                                            798.24     798.24
21      85. 5.0   531.59     790.81     164.67                                                           1487.07    1487.07
22      87. 5.0   773.50    1159.51     241.24                                                           2174.25    2174.25
23      89. 5.0   881.85    1337.52     280.94                                                           2500.31    2500.31
24      91. 5.0   788.29    1214.75     260.28                                                           2263.32    2263.32
25      93. 5.0   552.11     868.18     191.77                                                           1612.06    1612.06
26      95. 5.0   302.35     487.37     112.20                                                            901.92     901.92
27      97. 5.0   129.01     214.22      51.97                                                            395.20     395.20
28      99. 5.0    42.68      73.38      18.98                                                            135.05     135.05
29     101. 5.0    10.87      19.47       5.44                                                             35.78      35.78
30     103. 5.0     2.12       3.97       1.21                                                              7.30       7.30
CONCENTRATIONS FOR YEAR-DAY-HOUR, 83-365-18, ARE MISSING.

CONCENTRATIONS FOR YEAR-DAY-HOUR, 83-365-19, ARE MISSING.

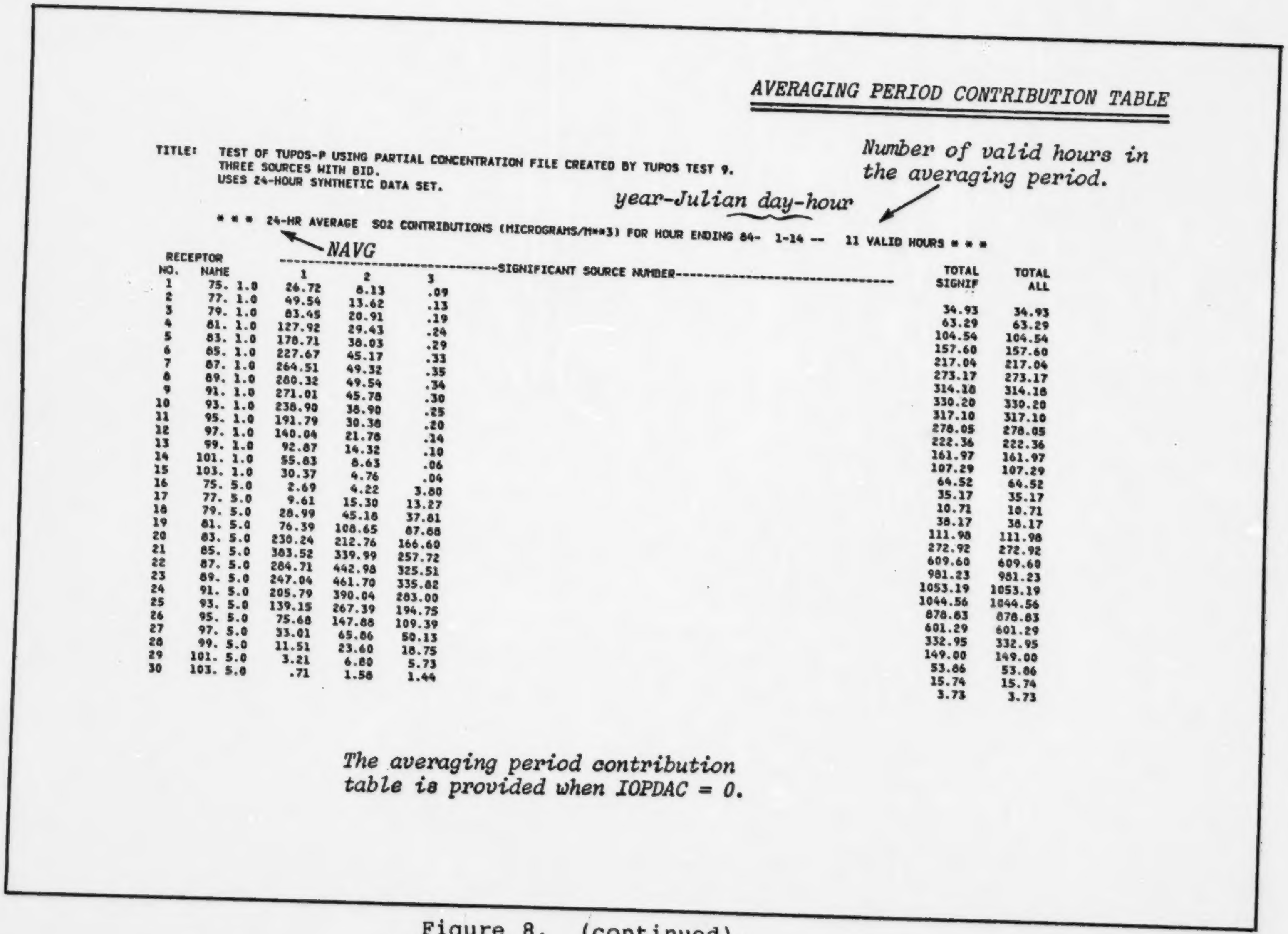
CONCENTRATIONS FOR YEAR-DAY-HOUR, 83-365-20, ARE MISSING.

CONCENTRATIONS FOR YEAR-DAY-HOUR, 83-365-21, ARE MISSING.
```

*Hours with missing concentrations are listed.*

*Output is abridged;*

Figure 8. (continued).



AVERAGING PERIOD CONTRIBUTION TABLE

```
TITLE:   TEST OF TUPOS-P USING PARTIAL CONCENTRATION FILE CREATED BY TUPOS TEST 9.
         THREE SOURCES WITH BID.
         USES 24-HOUR SYNTHETIC DATA SET.

      * * *  24-HR AVERAGE  SO2 CONTRIBUTIONS (MICROGRAMS/M**3) FOR HOUR ENDING 84-  1-14 --   11 VALID HOURS * * *

 RECEPTOR          ----------------------------SIGNIFICANT SOURCE NUMBER-----------------------------     TOTAL     TOTAL
 NO.   NAME           1         2         3                                                              SIGNIF      ALL
  1     75. 1.0     26.72      8.13       .09                                                             34.93     34.93
  2     77. 1.0     49.54     13.62       .13                                                             63.29     63.29
  3     79. 1.0     83.45     20.91       .19                                                            104.54    104.54
  4     81. 1.0    127.92     29.43       .24                                                            157.60    157.60
  5     83. 1.0    178.71     38.03       .29                                                            217.04    217.04
  6     85. 1.0    227.67     45.17       .33                                                            273.17    273.17
  7     87. 1.0    264.51     49.32       .35                                                            314.18    314.18
  8     89. 1.0    280.32     49.54       .34                                                            330.20    330.20
  9     91. 1.0    271.01     45.78       .30                                                            317.10    317.10
 10     93. 1.0    238.90     38.90       .25                                                            278.05    278.05
 11     95. 1.0    191.79     30.38       .20                                                            222.36    222.36
 12     97. 1.0    140.04     21.78       .14                                                            161.97    161.97
 13     99. 1.0     92.87     14.32       .10                                                            107.29    107.29
 14    101. 1.0     55.83      8.63       .06                                                             64.52     64.52
 15    103. 1.0     30.37      4.76       .04                                                             35.17     35.17
 16     75. 5.0      2.69      4.22      3.80                                                             10.71     10.71
 17     77. 5.0      9.61     15.30     13.27                                                             38.17     38.17
 18     79. 5.0     28.99     45.18     37.81                                                            111.98    111.98
 19     81. 5.0     76.39    108.65     87.88                                                            272.92    272.92
 20     83. 5.0    230.24    212.76    166.60                                                            609.60    609.60
 21     85. 5.0    383.52    339.99    257.72                                                            981.23    981.23
 22     87. 5.0    284.71    442.98    325.51                                                           1053.19   1053.19
 23     89. 5.0    247.04    461.70    335.82                                                           1044.56   1044.56
 24     91. 5.0    205.79    390.04    283.00                                                            878.83    878.83
 25     93. 5.0    139.15    267.39    194.75                                                            601.29    601.29
 26     95. 5.0     75.68    147.88    109.39                                                            332.95    332.95
 27     97. 5.0     33.01     65.86     50.13                                                            149.00    149.00
 28     99. 5.0     11.51     23.60     18.75                                                             53.86     53.86
 29    101. 5.0      3.21      6.80      5.73                                                             15.74     15.74
 30    103. 5.0       .71      1.58      1.44                                                              3.73      3.73
```

Number of valid hours in the averaging period.

year-Julian day-hour

NAVG

The averaging period contribution table is provided when IOPDAC = 0.

Figure 8. (continued).

### AVERAGING PERIOD CONCENTRATION TABLE

```
TITLE:   TEST OF TUPOS-P USING PARTIAL CONCENTRATION FILE CREATED BY TUPCS TEST 9.
         THREE SOURCES WITH BID.
         USES 24-HOUR SYNTHETIC DATA SET.

         * * *  24-HR AVERAGE  SO2 CONCENTRATION TABLE FOR HOUR ENDING 84-  1-14 --   11 VALID HOURS * * *
RECEPTOR    IDENTIFICATION        ------------COORDINATES------------    HEIGHT ABOVE
                                          (USER UNITS)                  LOCAL GRD-LVL     CONCENTRATION
                                   EAST       NORTH        ELEV             (M)         (MICROGRAMS/M**3)   RANK
    1          75. 1.0            200.97      400.26        .00              .00              34.93          27
    2          77. 1.0            200.97      400.22        .00              .00              63.29          23
    3          79. 1.0            200.98      400.19        .00              .00             104.54          21
    4          81. 1.0            200.99      400.16        .00              .00             157.60          17
    5          83. 1.0            200.99      400.12        .00              .00             217.04          15
    6          85. 1.0            201.00      400.09        .00              .00             273.17          12
    7          87. 1.0            201.00      400.05        .00              .00             314.18          10
    8          89. 1.0            201.00      400.02        .00              .00             330.20           8
    9          91. 1.0            201.00      399.98        .00              .00             317.10           9
   10          93. 1.0            201.00      399.95        .00              .00             278.05          11
   11          95. 1.0            201.00      399.91        .00              .00             222.36          14
   12          97. 1.0            200.99      399.88        .00              .00             161.97          16
   13          99. 1.0            200.99      399.84        .00              .00             107.29          20
   14         101. 1.0            200.98      399.81        .00              .00              64.52          22
   15         103. 1.0            200.97      399.78        .00              .00              35.17          26
   16          75. 5.0            204.83      401.29        .00              .00              10.71          29
   17          77. 5.0            204.87      401.12        .00              .00              38.17          25
   18          79. 5.0            204.91      400.95        .00              .00             111.98          19
   19          81. 5.0            204.94      400.78        .00              .00             272.92          13
   20          83. 5.0            204.96      400.61        .00              .00             609.60           5
   21          85. 5.0            204.98      400.44        .00              .00             981.23           3
   22          87. 5.0            204.99      400.26        .00              .00            1053.19           1
   23          89. 5.0            205.00      400.09        .00              .00            1044.56           2
   24          91. 5.0            205.00      399.91        .00              .00             878.83           4
   25          93. 5.0            204.99      399.74        .00              .00             601.29           6
   26          95. 5.0            204.98      399.56        .00              .00             332.95           7
   27          97. 5.0            204.96      399.39        .00              .00             149.00          18
   28          99. 5.0            204.94      399.22        .00              .00              53.86          24
   29         101. 5.0            204.91      399.05        .00              .00              15.74          28
   30         103. 5.0            204.87      398.88        .00              .00               3.73          30
```

*Receptors ranked according to concentration (from highest to lowest concentration).*

*The averaging period concentration table is provided when IOPDAS = 0. There is no need to provide both this page and the prior page since they provide essentially the same information.*

Figure 8. (continued).

*PERIOD OF RECORD AVERAGE CONCENTRATIONS*

*beginning and end of summary period*

*11 out of a possible 24 hours were considered in this average*

```
TITLE:   TEST OF TUPOS-P USING PARTIAL CONCENTRATION FILE CREATED BY TUPOS TEST 9.
         THREE SOURCES WITH BID.
         USES 24-HOUR SYNTHETIC DATA SET.

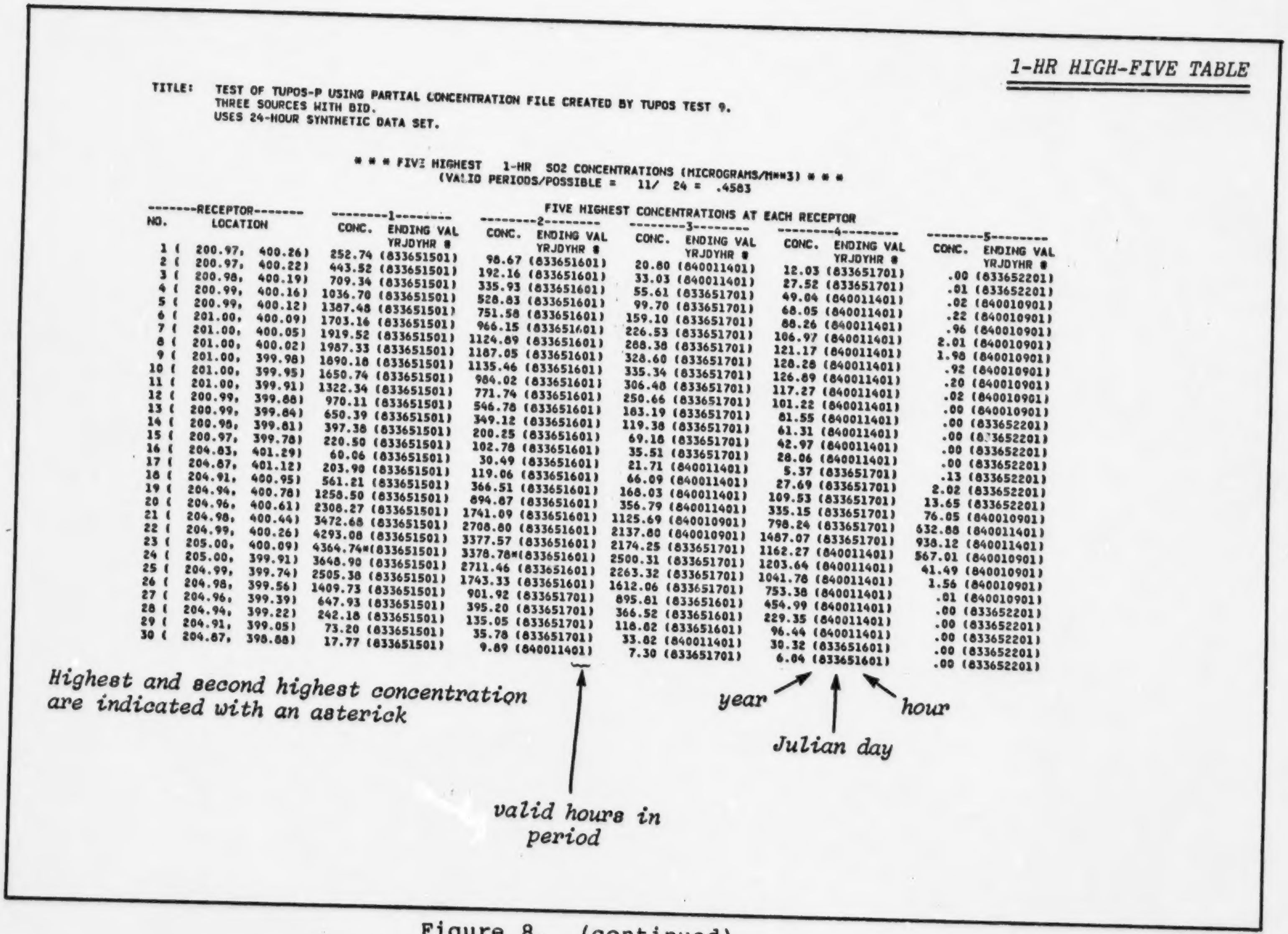
           * * * AVERAGE  SO2 CONCENTRATIONS FOR THE PERIOD 83-365-15 TO 84-  1-14 * * *
                        (VALID PERIODS/POSSIBLE =   11/  24 =  .4583

RECEPTOR   IDENTIFICATION     ------------COORDINATES------------   HEIGHT ABOVE
                                       (USER UNITS)                 LOCAL GRD-LVL    CONCENTRATION
                                EAST        NORTH        ELEV          (M)          (MICROGRAMS/M**3)
    1          75. 1.0         200.97      400.26         .00          .00               34.93
    2          77. 1.0         200.97      400.22         .00          .00               63.29
    3          79. 1.0         200.98      400.19         .00          .00              104.54
    4          81. 1.0         200.99      400.16         .00          .00              157.60
    5          83. 1.0         200.99      400.12         .00          .00              217.04
    6          85. 1.0         201.00      400.09         .00          .00              273.17
    7          87. 1.0         201.00      400.05         .00          .00              314.18
    8          89. 1.0         201.00      400.02         .00          .00              330.20
    9          91. 1.0         201.00      399.98         .00          .00              317.10
   10          93. 1.0         201.00      399.95         .00          .00              278.05
   11          95. 1.0         201.00      399.91         .00          .00              222.36
   12          97. 1.0         200.99      399.88         .00          .00              161.97
   13          99. 1.0         200.99      399.84         .00          .00              107.29
   14         101. 1.0         200.98      399.81         .00          .00               64.52
   15         103. 1.0         200.97      399.78         .00          .00               35.17
   16          75. 5.0         204.83      401.29         .00          .00               10.71
   17          77. 5.0         204.87      401.12         .00          .00               38.17
   18          79. 5.0         204.91      400.95         .00          .00              111.98
   19          81. 5.0         204.94      400.78         .00          .00              272.92
   20          83. 5.0         204.96      400.61         .00          .00              609.60
   21          85. 5.0         204.98      400.44         .00          .00              981.23
   22          87. 5.0         204.99      400.26         .00          .00             1053.19 *
   23          89. 5.0         205.00      400.09         .00          .00             1044.56
   24          91. 5.0         205.00      399.91         .00          .00              878.83
   25          93. 5.0         204.99      399.74         .00          .00              601.29
   26          95. 5.0         204.98      399.56         .00          .00              332.95
   27          97. 5.0         204.96      399.39         .00          .00              149.00
   28          99. 5.0         204.94      399.22         .00          .00               53.86
   29         101. 5.0         204.91      399.05         .00          .00               15.74
   30         103. 5.0         204.87      398.88         .00          .00                3.73
```

*This table and all succeeding tables are provided when IOPDHI = 0.*

*Receptor with the highest average concentration is indicated by an asterick.*

Figure 8. (continued).



1-HR HIGH-FIVE TABLE

```
TITLE:   TEST OF TUPOS-P USING PARTIAL CONCENTRATION FILE CREATED BY TUPOS TEST 9.
         THREE SOURCES WITH BID.
         USES 24-HOUR SYNTHETIC DATA SET.

                        * * * FIVE HIGHEST   1-HR  SO2 CONCENTRATIONS (MICROGRAMS/M**3) * * *
                                  (VALID PERIODS/POSSIBLE =    11/  24 =  .4583

                                                     FIVE HIGHEST CONCENTRATIONS AT EACH RECEPTOR
-------RECEPTOR-------  ---------1--------  ---------2--------  ---------3--------  ---------4--------  ---------5--------
NO.      LOCATION        CONC.  ENDING VAL    CONC.  ENDING VAL    CONC.  ENDING VAL    CONC.  ENDING VAL    CONC.  ENDING VAL
                                YRJDYHR #            YRJDYHR #            YRJDYHR #            YRJDYHR #            YRJDYHR #
  1 (  200.97,  400.26)   252.74 (833651501)   98.67 (833651601)   20.80 (840011401)   12.03 (833651701)     .00 (833652201)
  2 (  200.97,  400.22)   443.52 (833651501)  192.16 (833651601)   33.03 (840011401)   27.52 (833651701)     .01 (833652201)
  3 (  200.98,  400.19)   709.34 (833651501)  335.93 (833651601)   55.61 (833651701)   49.04 (840011401)     .02 (840010901)
  4 (  200.99,  400.16)  1036.70 (833651501)  528.83 (833651601)   99.70 (833651701)   68.05 (840011401)     .22 (840010901)
  5 (  200.99,  400.12)  1387.48 (833651501)  751.58 (833651601)  159.10 (833651701)   88.26 (840011401)     .96 (840010901)
  6 (  201.00,  400.09)  1703.16 (833651501)  966.15 (833651601)  226.53 (833651701)  106.97 (840011401)    2.01 (840010901)
  7 (  201.00,  400.05)  1919.52 (833651501) 1124.89 (833651601)  288.38 (833651701)  121.17 (840011401)    1.98 (840010901)
  8 (  201.00,  400.02)  1987.33 (833651501) 1187.05 (833651601)  328.60 (833651701)  128.28 (840011401)     .92 (840010901)
  9 (  201.00,  399.98)  1890.18 (833651501) 1135.46 (833651601)  335.34 (833651701)  126.89 (840011401)     .20 (840010901)
 10 (  201.00,  399.95)  1650.74 (833651501)  984.02 (833651601)  306.48 (833651701)  117.27 (840011401)     .02 (840010901)
 11 (  201.00,  399.91)  1322.34 (833651501)  771.74 (833651601)  250.66 (833651701)  101.22 (840011401)     .00 (840010901)
 12 (  200.99,  399.88)   970.11 (833651501)  546.78 (833651601)  183.19 (833651701)   81.55 (840011401)     .00 (833652201)
 13 (  200.99,  399.84)   650.39 (833651501)  349.12 (833651601)  119.38 (833651701)   61.31 (840011401)     .00 (833652201)
 14 (  200.98,  399.81)   397.38 (833651501)  200.25 (833651601)   69.18 (833651701)   42.97 (840011401)     .00 (833652201)
 15 (  200.97,  399.78)   220.50 (833651501)  102.78 (833651601)   35.51 (833651701)   28.06 (840011401)     .00 (833652201)
 16 (  204.83,  401.29)    60.06 (833651501)   30.49 (833651601)   21.71 (840011401)    5.37 (833651701)     .13 (833652201)
 17 (  204.87,  401.12)   203.90 (833651501)  119.06 (833651601)   66.09 (840011401)   27.69 (833651701)    2.02 (833652201)
 18 (  204.91,  400.95)   561.21 (833651501)  366.51 (833651601)  168.03 (840011401)  109.53 (833651701)   13.65 (833652201)
 19 (  204.94,  400.78)  1258.50 (833651501)  894.87 (833651601)  356.79 (840011401)  335.15 (833651701)   76.05 (840010901)
 20 (  204.96,  400.61)  2308.27 (833651501) 1741.09 (833651601) 1125.69 (840010901)  798.24 (833651701)  632.88 (840011401)
 21 (  204.98,  400.44)  3472.68 (833651501) 2708.80 (833651601) 2137.80 (840010901) 1487.07 (833651701)  938.12 (840011401)
 22 (  204.99,  400.26)  4293.08 (833651501) 3377.57 (833651601) 2174.25 (833651701) 1162.27 (840011401)  567.01 (840010901)
 23 (  205.00,  400.09)  4364.74*(833651501) 3378.78*(833651601) 2500.31 (833651701) 1203.64 (840011401)   41.49 (840010901)
 24 (  205.00,  399.91)  3648.90 (833651501) 2711.46 (833651601) 2263.32 (833651701) 1041.78 (840011401)    1.56 (840010901)
 25 (  204.99,  399.74)  2505.38 (833651501) 1743.33 (833651601) 1612.06 (833651701)  753.38 (840011401)     .01 (840010901)
 26 (  204.98,  399.56)  1409.73 (833651501)  901.92 (833651701)  895.81 (833651601)  454.99 (840011401)     .00 (833652201)
 27 (  204.96,  399.39)   647.93 (833651501)  395.20 (833651701)  366.52 (833651601)  229.35 (840011401)     .00 (833652201)
 28 (  204.94,  399.22)   242.18 (833651501)  135.05 (833651701)  118.82 (833651601)   96.44 (840011401)     .00 (833652201)
 29 (  204.91,  399.05)    73.20 (833651501)   35.78 (833651701)   33.82 (840011401)   30.32 (833651601)     .00 (833652201)
 30 (  204.87,  398.88)    17.77 (833651501)    9.89 (840011401)    7.30 (833651701)    6.04 (833651601)     .00 (833652201)
```

*Highest and second highest concentration are indicated with an asterick*

*valid hours in period*

Figure 8. (continued).

3-HR HIGH-FIVE TABLE

```
TITLE:   TEST OF TUPOS-P USING PARTIAL CONCENTRATION FILE CREATED BY TUPOS TEST 9.
         THREE SOURCES WITH BID.
         USES 24-HOUR SYNTHETIC DATA SET.

                        * * * FIVE HIGHEST   3-HR  SO2 CONCENTRATIONS (MICROGRAMS/M**3) * * *
                                  (VALID PERIODS/POSSIBLE =    6/   8 =  .7500

                                                    FIVE HIGHEST CONCENTRATIONS AT EACH RECEPTOR
-------RECEPTOR-------    --------1--------    --------2--------    --------3--------    --------4--------    --------5--------
NO.     LOCATION          CONC.  ENDING VAL    CONC.  ENDING VAL    CONC.  ENDING VAL    CONC.  ENDING VAL    CONC.  ENDING VAL
                                 YRJDYHR #            YRJDYHR #            YRJDYHR #            YRJDYHR #            YRJDYHR #
  1 (  200.97,  400.26)   121.15 (833651703)    20.80 (840011401)      .00 (833652302)      .00 (840011101)      .00 (840010502)
  2 (  200.97,  400.22)   221.06 (833651703)    33.03 (840011401)      .00 (833652302)      .00 (840011101)      .00 (840010502)
  3 (  200.98,  400.19)   366.96 (833651703)    49.04 (840011401)      .02 (840011101)      .01 (833652302)      .00 (840010502)
  4 (  200.99,  400.16)   555.08 (833651703)    68.05 (840011401)      .22 (840011101)      .02 (833652302)      .00 (840010502)
  5 (  200.99,  400.12)   766.05 (833651703)    88.26 (840011401)      .96 (840011101)      .03 (833652302)      .00 (840010502)
  6 (  201.00,  400.09)   965.28 (833651703)   106.97 (840011401)     2.01 (840011101)      .03 (833652302)      .00 (840010502)
  7 (  201.00,  400.05)  1110.93 (833651703)   121.17 (840011401)     1.98 (840011101)      .02 (833652302)      .00 (840010802)
  8 (  201.00,  400.02)  1167.66 (833651703)   128.28 (840011401)      .92 (840011101)      .01 (833652302)      .00 (840010502)
  9 (  201.00,  399.98)  1120.33 (833651703)   126.89 (840011401)      .20 (840011101)      .00 (833652302)      .00 (840010502)
 10 (  201.00,  399.95)   980.41 (833651703)   117.27 (840011401)      .02 (840011101)      .00 (833652302)      .00 (840010502)
 11 (  201.00,  399.91)   781.58 (833651703)   101.22 (840011401)      .00 (840011101)      .00 (833652302)      .00 (840010502)
 12 (  200.99,  399.88)   566.69 (833651703)    81.55 (840011401)      .00 (833652302)      .00 (840011101)      .00 (840010502)
 13 (  200.99,  399.84)   372.97 (833651703)    61.31 (840011401)      .00 (833652302)      .00 (840011101)      .00 (840010502)
 14 (  200.98,  399.81)   222.27 (833651703)    42.97 (840011401)      .00 (833652302)      .00 (840011101)      .00 (840010502)
 15 (  200.97,  399.78)   119.59 (833651703)    28.06 (840011401)      .00 (833652302)      .00 (840011101)      .00 (840010502)
 16 (  204.83,  401.29)    31.97 (833651703)    21.71 (840011401)      .08 (833652302)      .00 (840010502)      .00 (840011101)
 17 (  204.87,  401.12)   116.88 (833651703)    66.09 (840011401)     1.53 (833652302)      .06 (840010502)      .00 (840011101)
 18 (  204.91,  400.95)   345.75 (833651703)   168.03 (840011401)    12.26 (833652302)      .65 (840010502)      .65 (840011101)
 19 (  204.94,  400.78)   829.51 (833651703)   356.79 (840011401)    76.05 (840011101)    39.16 (833652302)     1.11 (840010502)
 20 (  204.96,  400.61)  1615.87 (833651703)  1125.69 (840011101)   632.88 (840011401)    48.53 (833652302)      .81 (840010802)
 21 (  204.98,  400.44)  2556.18 (833651703)  2137.80*(840011101)   938.12 (840011401)    24.40 (833652302)      .09 (840010802)
 22 (  204.99,  400.26)  3281.63 (833651703)  1162.27 (840011401)   567.01 (840011101)     5.47 (833652302)      .00 (840010502)
 23 (  205.00,  400.09)  3414.61*(833651703)  1203.64 (840011401)    41.49 (840011101)      .59 (833652302)      .00 (840010502)
 24 (  205.00,  399.91)  2874.56 (833651703)  1041.78 (840011401)     1.56 (840011101)      .03 (833652302)      .00 (840010502)
 25 (  204.99,  399.74)  1953.59 (833651703)   753.38 (840011401)      .01 (840011101)      .00 (833652302)      .00 (840010502)
 26 (  204.98,  399.56)  1069.15 (833651703)   454.99 (840011401)      .00 (840011101)      .00 (833652302)      .00 (840010502)
 27 (  204.96,  399.39)   469.88 (833651703)   229.35 (840011401)      .00 (833652302)      .00 (840011101)      .00 (840010502)
 28 (  204.94,  399.22)   165.35 (833651703)    96.44 (840011401)      .00 (833652302)      .00 (840011101)      .00 (840010502)
 29 (  204.91,  399.05)    46.43 (833651703)    33.82 (840011401)      .00 (833652302)      .00 (840011101)      .00 (840010502)
 30 (  204.87,  398.88)    10.37 (833651703)     9.89 (840011401)      .00 (833652302)      .00 (840011101)      .00 (        0)
```

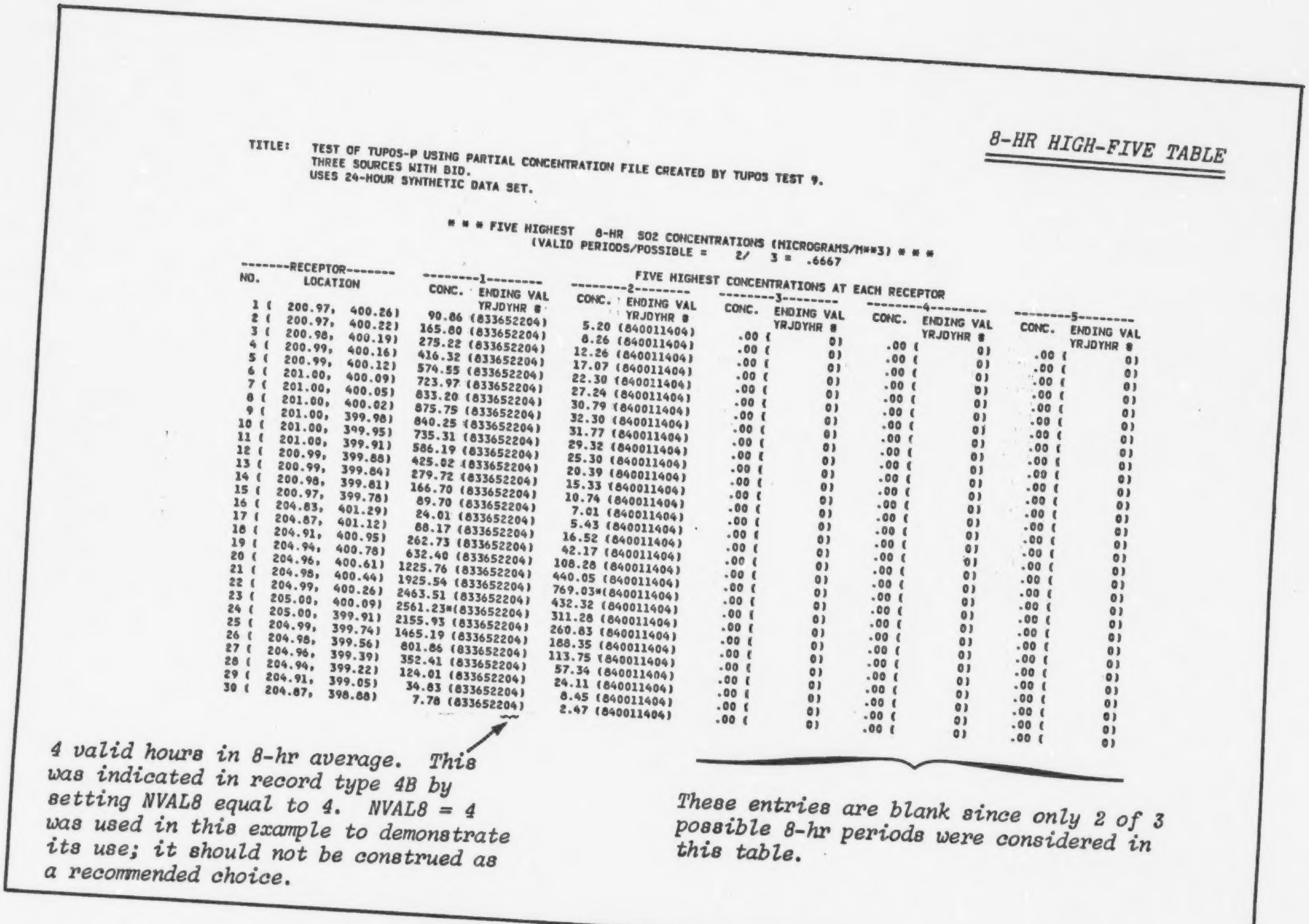
*6 of 8 possible 3-hr periods were considered in this table.*

*3 valid hours in 3-hr averaging period.*

*1 valid hour in 3-hr averaging period. This was indicated in record type 4B by setting NVAL3 equal to 1. NVAL3 = 1 was used in this example to demonstrate its use; it should not be construed as a recommended choice.*

Figure 8. (continued).

## 8-HR HIGH-FIVE TABLE



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TITLE:   TEST OF TUPOS-P USING PARTIAL CONCENTRATION FILE CREATED BY TUPOS TEST 9.
         THREE SOURCES WITH BID.
         USES 24-HOUR SYNTHETIC DATA SET.

                     * * * FIVE HIGHEST   8-HR  SO2 CONCENTRATIONS (MICROGRAMS/M**3) * * *
                                  (VALID PERIODS/POSSIBLE =    2/   3 =  .6667

-------RECEPTOR-------                                FIVE HIGHEST CONCENTRATIONS AT EACH RECEPTOR
NO.      LOCATION        --------1--------     --------2--------     --------3--------     --------4--------     --------5--------
                         CONC.  ENDING VAL     CONC.  ENDING VAL     CONC.  ENDING VAL     CONC.  ENDING VAL     CONC.  ENDING VAL
                                YRJDYHR #             YRJDYHR #             YRJDYHR #             YRJDYHR #             YRJDYHR #
  1 (  200.97,  400.26)    90.86 (833652204)     5.20 (840011404)      .00 (         0)      .00 (         0)      .00 (         0)
  2 (  200.97,  400.22)   165.80 (833652204)     8.26 (840011404)      .00 (         0)      .00 (         0)      .00 (         0)
  3 (  200.98,  400.19)   275.22 (833652204)    12.26 (840011404)      .00 (         0)      .00 (         0)      .00 (         0)
  4 (  200.99,  400.16)   416.32 (833652204)    17.07 (840011404)      .00 (         0)      .00 (         0)      .00 (         0)
  5 (  200.99,  400.12)   574.55 (833652204)    22.30 (840011404)      .00 (         0)      .00 (         0)      .00 (         0)
  6 (  201.00,  400.09)   723.97 (833652204)    27.24 (840011404)      .00 (         0)      .00 (         0)      .00 (         0)
  7 (  201.00,  400.05)   833.20 (833652204)    30.79 (840011404)      .00 (         0)      .00 (         0)      .00 (         0)
  8 (  201.00,  400.02)   875.75 (833652204)    32.30 (840011404)      .00 (         0)      .00 (         0)      .00 (         0)
  9 (  201.00,  399.98)   840.25 (833652204)    31.77 (840011404)      .00 (         0)      .00 (         0)      .00 (         0)
 10 (  201.00,  399.95)   735.31 (833652204)    29.32 (840011404)      .00 (         0)      .00 (         0)      .00 (         0)
 11 (  201.00,  399.91)   586.19 (833652204)    25.30 (840011404)      .00 (         0)      .00 (         0)      .00 (         0)
 12 (  200.99,  399.88)   425.02 (833652204)    20.39 (840011404)      .00 (         0)      .00 (         0)      .00 (         0)
 13 (  200.99,  399.84)   279.72 (833652204)    15.33 (840011404)      .00 (         0)      .00 (         0)      .00 (         0)
 14 (  200.98,  399.81)   166.70 (833652204)    10.74 (840011404)      .00 (         0)      .00 (         0)      .00 (         0)
 15 (  200.97,  399.78)    89.70 (833652204)     7.01 (840011404)      .00 (         0)      .00 (         0)      .00 (         0)
 16 (  204.83,  401.29)    24.01 (833652204)     5.43 (840011404)      .00 (         0)      .00 (         0)      .00 (         0)
 17 (  204.87,  401.12)    88.17 (833652204)    16.52 (840011404)      .00 (         0)      .00 (         0)      .00 (         0)
 18 (  204.91,  400.95)   262.73 (833652204)    42.17 (840011404)      .00 (         0)      .00 (         0)      .00 (         0)
 19 (  204.94,  400.78)   632.40 (833652204)   108.28 (840011404)      .00 (         0)      .00 (         0)      .00 (         0)
 20 (  204.96,  400.61)  1225.76 (833652204)   440.05 (840011404)      .00 (         0)      .00 (         0)      .00 (         0)
 21 (  204.98,  400.44)  1925.54 (833652204)   769.03*(840011404)      .00 (         0)      .00 (         0)      .00 (         0)
 22 (  204.99,  400.26)  2463.51 (833652204)   432.32 (840011404)      .00 (         0)      .00 (         0)      .00 (         0)
 23 (  205.00,  400.09)  2561.23*(833652204)   311.28 (840011404)      .00 (         0)      .00 (         0)      .00 (         0)
 24 (  205.00,  399.91)  2155.93 (833652204)   260.83 (840011404)      .00 (         0)      .00 (         0)      .00 (         0)
 25 (  204.99,  399.74)  1465.19 (833652204)   188.35 (840011404)      .00 (         0)      .00 (         0)      .00 (         0)
 26 (  204.98,  399.56)   801.86 (833652204)   113.75 (840011404)      .00 (         0)      .00 (         0)      .00 (         0)
 27 (  204.96,  399.39)   352.41 (833652204)    57.34 (840011404)      .00 (         0)      .00 (         0)      .00 (         0)
 28 (  204.94,  399.22)   124.01 (833652204)    24.11 (840011404)      .00 (         0)      .00 (         0)      .00 (         0)
 29 (  204.91,  399.05)    34.83 (833652204)     8.45 (840011404)      .00 (         0)      .00 (         0)      .00 (         0)
 30 (  204.87,  398.88)     7.78 (833652204)     2.47 (840011404)      .00 (         0)      .00 (         0)      .00 (         0)
```

*4 valid hours in 8-hr average. This was indicated in record type 4B by setting NVAL8 equal to 4. NVAL8 = 4 was used in this example to demonstrate its use; it should not be construed as a recommended choice.*

*These entries are blank since only 2 of 3 possible 8-hr periods were considered in this table.*

Figure 8. (continued).

```
TITLE:   TEST OF TUPOS-P USING PARTIAL CONCENTRATION FILE CREATED BY TUPOS TEST 9.          24-HR HIGH-FIVE TABLE
         THREE SOURCES WITH BID.
         USES 24-HOUR SYNTHETIC DATA SET.

                              * * * FIVE HIGHEST  24-HR  SO2 CONCENTRATIONS (MICROGRAMS/M**3) * * *
                                        (VALID PERIODS/POSSIBLE =    0/   1 =  .0000

                                                           FIVE HIGHEST CONCENTRATIONS AT EACH RECEPTOR
-------RECEPTOR-------    --------1--------    --------2--------    --------3--------    --------4--------    --------5--------
NO.       LOCATION        CONC.  ENDING VAL    CONC.  ENDING VAL    CONC.  ENDING VAL    CONC.  ENDING VAL    CONC.  ENDING VAL
                                 YRJDYHR #            YRJDYHR #            YRJDYHR #            YRJDYHR #            YRJDYHR #
  1 (  200.97,  400.26)     .00*(         0)     .00*(         0)     .00 (         0)     .00 (         0)     .00 (         0)
  2 (  200.97,  400.22)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)
  3 (  200.98,  400.19)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)
  4 (  200.99,  400.16)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)
  5 (  200.99,  400.12)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)
  6 (  201.00,  400.09)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)
  7 (  201.00,  400.05)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)
  8 (  201.00,  400.02)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)
  9 (  201.00,  399.98)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)
 10 (  201.00,  399.95)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)
 11 (  201.00,  399.91)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)
 12 (  200.99,  399.88)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)
 13 (  200.99,  399.84)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)
 14 (  200.98,  399.81)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)
 15 (  200.97,  399.78)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)
 16 (  204.83,  401.29)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)
 17 (  204.87,  401.12)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)
 18 (  204.91,  400.95)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)
 19 (  204.94,  400.78)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)
 20 (  204.96,  400.61)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)
 21 (  204.98,  400.44)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)
 22 (  204.99,  400.26)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)
 23 (  205.00,  400.09)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)
 24 (  205.00,  399.91)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)
 25 (  204.99,  399.74)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)
 26 (  204.98,  399.56)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)
 27 (  204.96,  399.39)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)
 28 (  204.94,  399.22)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)
 29 (  204.91,  399.05)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)
 30 (  204.87,  398.88)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)     .00 (         0)
```

*All entries are zero due to requirement for 12 valid hours to make up a valid 24-hour period (NVAL 24=12). Only 11 valid hours were available. 12 hours should not be construed as a recommended choice.*

Figure 8. (continued).

12-HR HIGH-FIVE TABLE

```
TITLE:   TEST OF TUPOS-P USING PARTIAL CONCENTRATION FILE CREATED BY TUPOS TEST 9.
         THREE SOURCES WITH BID.
         USES 24-HOUR SYNTHETIC DATA SET.

                    * * * FIVE HIGHEST  12-HR  SO2 CONCENTRATIONS (MICROGRAMS/M**3) * * *
                              (VALID PERIODS/POSSIBLE =    1/   2 =  .5000

                                                  FIVE HIGHEST CONCENTRATIONS AT EACH RECEPTOR
-------RECEPTOR-------    --------1--------    --------2--------    --------3--------    --------4--------    --------5--------
NO.      LOCATION         CONC.  ENDING VAL    CONC.  ENDING VAL    CONC.  ENDING VAL    CONC.  ENDING VAL    CONC.  ENDING VAL
                                 YRJDYHR #            YRJDYHR #            YRJDYHR #            YRJDYHR #            YRJDYHR #
 1 (  200.97,  400.26)     3.47 (840011406)     .00*(          0)     .00 (          0)     .00 (          0)     .00 (          0)
 2 (  200.97,  400.22)     5.50 (840011406)     .00 (          0)     .00 (          0)     .00 (          0)     .00 (          0)
 3 (  200.98,  400.19)     8.18 (840011406)     .00 (          0)     .00 (          0)     .00 (          0)     .00 (          0)
 4 (  200.99,  400.16)    11.38 (840011406)     .00 (          0)     .00 (          0)     .00 (          0)     .00 (          0)
 5 (  200.99,  400.12)    14.87 (840011406)     .00 (          0)     .00 (          0)     .00 (          0)     .00 (          0)
 6 (  201.00,  400.09)    18.16 (840011406)     .00 (          0)     .00 (          0)     .00 (          0)     .00 (          0)
 7 (  201.00,  400.05)    20.53 (840011406)     .00 (          0)     .00 (          0)     .00 (          0)     .00 (          0)
 8 (  201.00,  400.02)    21.53 (840011406)     .00 (          0)     .00 (          0)     .00 (          0)     .00 (          0)
 9 (  201.00,  399.98)    21.18 (840011406)     .00 (          0)     .00 (          0)     .00 (          0)     .00 (          0)
10 (  201.00,  399.95)    19.55 (840011406)     .00 (          0)     .00 (          0)     .00 (          0)     .00 (          0)
11 (  201.00,  399.91)    16.87 (840011406)     .00 (          0)     .00 (          0)     .00 (          0)     .00 (          0)
12 (  200.99,  399.88)    13.59 (840011406)     .00 (          0)     .00 (          0)     .00 (          0)     .00 (          0)
13 (  200.99,  399.84)    10.22 (840011406)     .00 (          0)     .00 (          0)     .00 (          0)     .00 (          0)
14 (  200.98,  399.81)     7.16 (840011406)     .00 (          0)     .00 (          0)     .00 (          0)     .00 (          0)
15 (  200.97,  399.78)     4.68 (840011406)     .00 (          0)     .00 (          0)     .00 (          0)     .00 (          0)
16 (  204.83,  401.29)     3.62 (840011406)     .00 (          0)     .00 (          0)     .00 (          0)     .00 (          0)
17 (  204.87,  401.12)    11.04 (840011406)     .00 (          0)     .00 (          0)     .00 (          0)     .00 (          0)
18 (  204.91,  400.95)    28.33 (840011406)     .00 (          0)     .00 (          0)     .00 (          0)     .00 (          0)
19 (  204.94,  400.78)    72.55 (840011406)     .00 (          0)     .00 (          0)     .00 (          0)     .00 (          0)
20 (  204.96,  400.61)   293.49 (840011406)     .00 (          0)     .00 (          0)     .00 (          0)     .00 (          0)
21 (  204.98,  400.44)   512.69*(840011406)     .00 (          0)     .00 (          0)     .00 (          0)     .00 (          0)
22 (  204.99,  400.26)   288.21 (840011406)     .00 (          0)     .00 (          0)     .00 (          0)     .00 (          0)
23 (  205.00,  400.09)   207.52 (840011406)     .00 (          0)     .00 (          0)     .00 (          0)     .00 (          0)
24 (  205.00,  399.91)   173.89 (840011406)     .00 (          0)     .00 (          0)     .00 (          0)     .00 (          0)
25 (  204.99,  399.74)   125.57 (840011406)     .00 (          0)     .00 (          0)     .00 (          0)     .00 (          0)
26 (  204.98,  399.56)    75.83 (840011406)     .00 (          0)     .00 (          0)     .00 (          0)     .00 (          0)
27 (  204.96,  399.39)    38.22 (840011406)     .00 (          0)     .00 (          0)     .00 (          0)     .00 (          0)
28 (  204.94,  399.22)    16.07 (840011406)     .00 (          0)     .00 (          0)     .00 (          0)     .00 (          0)
29 (  204.91,  399.05)     5.64 (840011406)     .00 (          0)     .00 (          0)     .00 (          0)     .00 (          0)
30 (  204.87,  398.88)     1.65 (840011406)     .00 (          0)     .00 (          0)     .00 (          0)     .00 (          0)

*** NORMAL TERMINATION ***
```

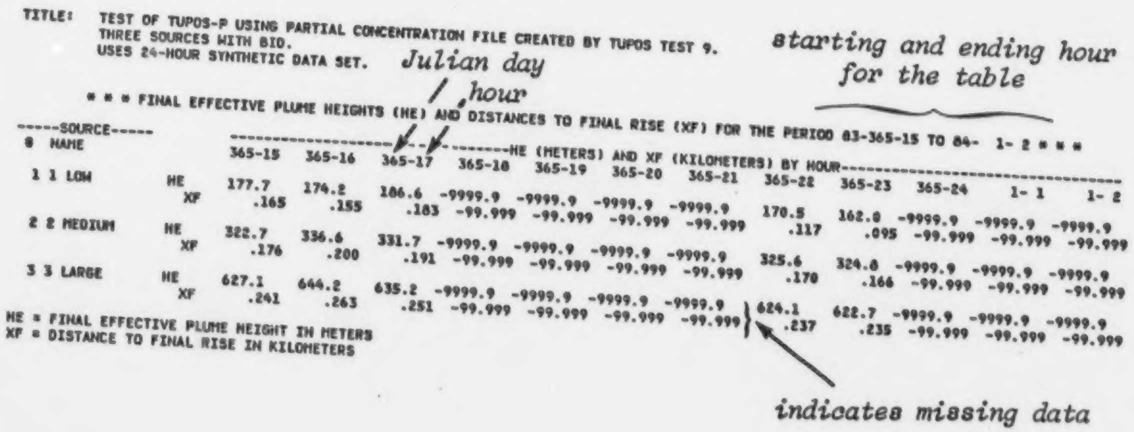
*NAV5*

*6 valid hours in 12-hr averaging period. This was indicated in record type 4B by setting NVALX equal to 6. NVALX = 6 was used in this example to demonstrate its use; it should not be construed as a recommended choice.*

*Indicates successful completion.*

*A 12-hr high-five table is provided since NAV5 = 12 on record type 4B.*

Figure 8. (continued).



```
TITLE:   TEST OF TUPOS-P USING PARTIAL CONCENTRATION FILE CREATED BY TUPOS TEST 9.
         THREE SOURCES WITH BID.
         USES 24-HOUR SYNTHETIC DATA SET.

       * * * FINAL EFFECTIVE PLUME HEIGHTS (HE) AND DISTANCES TO FINAL RISE (XF) FOR THE PERIOD 83-365-15 TO 84-  1- 2 * * *
-----SOURCE-----
#  NAME                 ------------------------------------HE (METERS) AND XF (KILOMETERS) BY HOUR----------------------------------
                        365-15   365-16   365-17   365-18   365-19   365-20   365-21   365-22   365-23   365-24     1- 1     1- 2
 1 1 LOW        HE      177.7    174.2    186.6  -9999.9  -9999.9  -9999.9  -9999.9    170.5    162.8  -9999.9  -9999.9  -9999.9
                  XF       .165     .155     .183  -99.999  -99.999  -99.999  -99.999     .117     .095  -99.999  -99.999  -99.999
 2 2 MEDIUM     HE      322.7    336.6    331.7  -9999.9  -9999.9  -9999.9  -9999.9    325.6    324.8  -9999.9  -9999.9  -9999.9
                  XF       .176     .200     .191  -99.999  -99.999  -99.999  -99.999     .178     .166  -99.999  -99.999  -99.999
 3 3 LARGE      HE      627.1    644.2    635.2  -9999.9  -9999.9  -9999.9  -9999.9    624.1    622.7  -9999.9  -9999.9  -9999.9
                  XF       .241     .263     .251  -99.999  -99.999  -99.999  -99.999     .237     .235  -99.999  -99.999  -99.999
HE = FINAL EFFECTIVE PLUME HEIGHT IN METERS
XF = DISTANCE TO FINAL RISE IN KILOMETERS
```

*Information on this page would* <u>*not*</u> *have been provided if IOPDPH = 1.*

Figure 9. Hourly plume and concentration summaries for the example problem.

```
TITLE:   TEST OF TUPOS-P USING PARTIAL CONCENTRATION FILE CREATED BY TUPOS TEST 9.
         THREE SOURCES WITH BID.
         USES 24-HOUR SYNTHETIC DATA SET.

                        * * *  SO2 CONCENTRATIONS FOR THE PERIOD 83-365-15 TO 84-  1- 2 * * *

---RECEPTOR---     ----------------------------------CONCENTRATIONS (MICROGRAMS/M**3) BY HOUR-----------------------------
 NO.   NAME         365-15   365-16   365-17   365-18   365-19   365-20   365-21   365-22   365-23   365-24     1- 1     1- 2

  1    75. 1.0       252.7     98.7     12.0  -9999.9  -9999.9  -9999.9  -9999.9       .0       .0  -9999.9  -9999.9  -9999.9
  2    77. 1.0       443.5    192.2     27.5  -9999.9  -9999.9  -9999.9  -9999.9       .0       .0  -9999.9  -9999.9  -9999.9
  3    79. 1.0       709.3    335.9     55.6  -9999.9  -9999.9  -9999.9  -9999.9       .0       .0  -9999.9  -9999.9  -9999.9
  4    81. 1.0      1036.7    528.8     99.7  -9999.9  -9999.9  -9999.9  -9999.9       .0       .0  -9999.9  -9999.9  -9999.9
  5    83. 1.0      1387.5    751.6    159.1  -9999.9  -9999.9  -9999.9  -9999.9       .0       .0  -9999.9  -9999.9  -9999.9
  6    85. 1.0      1703.2    966.2    226.5  -9999.9  -9999.9  -9999.9  -9999.9       .0       .0  -9999.9  -9999.9  -9999.9
  7    87. 1.0      1919.5   1124.9    288.4  -9999.9  -9999.9  -9999.9  -9999.9       .0       .0  -9999.9  -9999.9  -9999.9
  8    89. 1.0      1987.3   1187.0    328.6  -9999.9  -9999.9  -9999.9  -9999.9       .0       .0  -9999.9  -9999.9  -9999.9
  9    91. 1.0      1890.2   1135.5    335.3  -9999.9  -9999.9  -9999.9  -9999.9       .0       .0  -9999.9  -9999.9  -9999.9
 10    93. 1.0      1650.7    984.0    306.5  -9999.9  -9999.9  -9999.9  -9999.9       .0       .0  -9999.9  -9999.9  -9999.9
 11    95. 1.0      1322.3    771.7    250.7  -9999.9  -9999.9  -9999.9  -9999.9       .0       .0  -9999.9  -9999.9  -9999.9
 12    97. 1.0       970.1    546.8    183.2  -9999.9  -9999.9  -9999.9  -9999.9       .0       .0  -9999.9  -9999.9  -9999.9
 13    99. 1.0       650.4    349.1    119.4  -9999.9  -9999.9  -9999.9  -9999.9       .0       .0  -9999.9  -9999.9  -9999.9
 14   101. 1.0       397.4    200.2     69.2  -9999.9  -9999.9  -9999.9  -9999.9       .0       .0  -9999.9  -9999.9  -9999.9
 15   103. 1.0       220.5    102.8     35.5  -9999.9  -9999.9  -9999.9  -9999.9       .0       .0  -9999.9  -9999.9  -9999.9
 16    75. 5.0        60.1     30.5      5.4  -9999.9  -9999.9  -9999.9  -9999.9       .1       .0  -9999.9  -9999.9  -9999.9
 17    77. 5.0       203.9    119.1     27.7  -9999.9  -9999.9  -9999.9  -9999.9      2.0      1.0  -9999.9  -9999.9  -9999.9
 18    79. 5.0       561.2    366.5    109.5  -9999.9  -9999.9  -9999.9  -9999.9     13.7     10.9  -9999.9  -9999.9  -9999.9
 19    81. 5.0      1258.5    894.9    335.2  -9999.9  -9999.9  -9999.9  -9999.9     41.1     37.2  -9999.9  -9999.9  -9999.9
 20    83. 5.0      2308.3   1741.1    798.2  -9999.9  -9999.9  -9999.9  -9999.9     55.4     41.6  -9999.9  -9999.9  -9999.9
 21    85. 5.0      3472.7   2708.8   1487.1  -9999.9  -9999.9  -9999.9  -9999.9     33.6     15.2  -9999.9  -9999.9  -9999.9
 22    87. 5.0      4293.1   3377.6   2174.3  -9999.9  -9999.9  -9999.9  -9999.9      9.1      1.8  -9999.9  -9999.9  -9999.9
 23    89. 5.0      4364.7   3378.8   2500.3  -9999.9  -9999.9  -9999.9  -9999.9      1.1       .1  -9999.9  -9999.9  -9999.9
 24    91. 5.0      3648.9   2711.5   2263.3  -9999.9  -9999.9  -9999.9  -9999.9       .1       .0  -9999.9  -9999.9  -9999.9
 25    93. 5.0      2505.4   1743.3   1612.1  -9999.9  -9999.9  -9999.9  -9999.9       .0       .0  -9999.9  -9999.9  -9999.9
 26    95. 5.0      1409.7    895.8    901.9  -9999.9  -9999.9  -9999.9  -9999.9       .0       .0  -9999.9  -9999.9  -9999.9
 27    97. 5.0       647.9    366.5    395.2  -9999.9  -9999.9  -9999.9  -9999.9       .0       .0  -9999.9  -9999.9  -9999.9
 28    99. 5.0       242.2    118.8    135.0  -9999.9  -9999.9  -9999.9  -9999.9       .0       .0  -9999.9  -9999.9  -9999.9
 29   101. 5.0        73.2     30.3     35.8  -9999.9  -9999.9  -9999.9  -9999.9       .0       .0  -9999.9  -9999.9  -9999.9
 30   103. 5.0        17.8      6.0      7.3  -9999.9  -9999.9  -9999.9  -9999.9       .0       .0  -9999.9  -9999.9  -9999.9
```

*pollutant*

*starting and ending hour for the table*

*Julian day*

*hour*

*indicates missing data*

*Information on this page would not have been provided if IOPDHS = 1.*

Figure 9. (continued).

```
TITLE:   TEST OF TUPOS-P USING PARTIAL CONCENTRATION FILE CREATED BY TUPOS TEST 9.
         THREE SOURCES WITH BID.
         USES 24-HOUR SYNTHETIC DATA SET.

       * * * FINAL EFFECTIVE PLUME HEIGHTS (HE) AND DISTANCES TO FINAL RISE (XF) FOR THE PERIOD 84-  1- 3 TO 84-  1-14 * * *
-----SOURCE-----      ---------------------------------HE (METERS) AND XF (KILOMETERS) BY HOUR----------------------------------
 #  NAME                  1- 3     1- 4     1- 5     1- 6     1- 7     1- 8     1- 9     1-10     1-11     1-12     1-13     1-14
 1 1 LOW         HE      144.5    143.9  -9999.9  -9999.9    142.9    143.1    145.5  -9999.9  -9999.9  -9999.9  -9999.9    349.0
                   XF       .051     .048  -99.999  -99.999     .049     .057     .073  -99.999  -99.999  -99.999  -99.999     .723
 2 2 MEDIUM      HE      323.1    323.1  -9999.9  -9999.9    299.5    305.0    311.5  -9999.9  -9999.9  -9999.9  -9999.9    711.3
                   XF       .153     .152  -99.999  -99.999     .120     .131     .147  -99.999  -99.999  -99.999  -99.999    1.136
 3 3 LARGE       HE      619.9    619.9  -9999.9  -9999.9    595.8    606.7    619.6  -9999.9  -9999.9  -9999.9  -9999.9   1178.3
                   XF       .231     .231  -99.999  -99.999     .229     .243     .261  -99.999  -99.999  -99.999  -99.999    1.204
HE = FINAL EFFECTIVE PLUME HEIGHT IN METERS
XF = DISTANCE TO FINAL RISE IN KILOMETERS
```

Figure 9. (continued).

```
TITLE:   TEST OF TUPOS-P USING PARTIAL CONCENTRATION FILE CREATED BY TUPOS TEST 9.
         THREE SOURCES WITH BID.
         USES 24-HOUR SYNTHETIC DATA SET.

                      * * *  SO2 CONCENTRATIONS FOR THE PERIOD 84-  1- 3 TO 84-  1-14 * * *

---RECEPTOR---      ----------------------------------CONCENTRATIONS (MICROGRAMS/M**3) BY HOUR----------------------------------
 NO.   NAME            1- 3      1- 4      1- 5      1- 6      1- 7      1- 8      1- 9      1-10      1-11      1-12      1-13      1-14

  1    75. 1.0           .0        .0   -9999.9   -9999.9        .0        .0        .0   -9999.9   -9999.9   -9999.9   -9999.9      20.8
  2    77. 1.0           .0        .0   -9999.9   -9999.9        .0        .0        .0   -9999.9   -9999.9   -9999.9   -9999.9      33.0
  3    79. 1.0           .0        .0   -9999.9   -9999.9        .0        .0        .0   -9999.9   -9999.9   -9999.9   -9999.9      49.0
  4    81. 1.0           .0        .0   -9999.9   -9999.9        .0        .0        .2   -9999.9   -9999.9   -9999.9   -9999.9      68.0
  5    83. 1.0           .0        .0   -9999.9   -9999.9        .0        .0       1.0   -9999.9   -9999.9   -9999.9   -9999.9      88.3
  6    85. 1.0           .0        .0   -9999.9   -9999.9        .0        .0       2.0   -9999.9   -9999.9   -9999.9   -9999.9     107.0
  7    87. 1.0           .0        .0   -9999.9   -9999.9        .0        .0       2.0   -9999.9   -9999.9   -9999.9   -9999.9     121.2
  8    89. 1.0           .0        .0   -9999.9   -9999.9        .0        .0        .9   -9999.9   -9999.9   -9999.9   -9999.9     128.3
  9    91. 1.0           .0        .0   -9999.9   -9999.9        .0        .0        .2   -9999.9   -9999.9   -9999.9   -9999.9     126.9
 10    93. 1.0           .0        .0   -9999.9   -9999.9        .0        .0        .0   -9999.9   -9999.9   -9999.9   -9999.9     117.3
 11    95. 1.0           .0        .0   -9999.9   -9999.9        .0        .0        .0   -9999.9   -9999.9   -9999.9   -9999.9     101.2
 12    97. 1.0           .0        .0   -9999.9   -9999.9        .0        .0        .0   -9999.9   -9999.9   -9999.9   -9999.9      81.6
 13    99. 1.0           .0        .0   -9999.9   -9999.9        .0        .0        .0   -9999.9   -9999.9   -9999.9   -9999.9      61.3
 14   101. 1.0           .0        .0   -9999.9   -9999.9        .0        .0        .0   -9999.9   -9999.9   -9999.9   -9999.9      43.0
 15   103. 1.0           .0        .0   -9999.9   -9999.9        .0        .0        .0   -9999.9   -9999.9   -9999.9   -9999.9      28.1
 16    75. 5.0           .0        .0   -9999.9   -9999.9        .0        .0        .0   -9999.9   -9999.9   -9999.9   -9999.9      21.7
 17    77. 5.0           .0        .1   -9999.9   -9999.9        .0        .0        .0   -9999.9   -9999.9   -9999.9   -9999.9      66.1
 18    79. 5.0           .7        .6   -9999.9   -9999.9        .0        .0        .6   -9999.9   -9999.9   -9999.9   -9999.9     168.0
 19    81. 5.0          1.9        .3   -9999.9   -9999.9        .0        .2      76.0   -9999.9   -9999.9   -9999.9   -9999.9     356.8
 20    83. 5.0           .7        .0   -9999.9   -9999.9        .0       1.6    1125.7   -9999.9   -9999.9   -9999.9   -9999.9     632.9
 21    85. 5.0           .0        .0   -9999.9   -9999.9        .0        .2    2137.8   -9999.9   -9999.9   -9999.9   -9999.9     938.1
 22    87. 5.0           .0        .0   -9999.9   -9999.9        .0        .0     567.0   -9999.9   -9999.9   -9999.9   -9999.9    1162.3
 23    89. 5.0           .0        .0   -9999.9   -9999.9        .0        .0      41.5   -9999.9   -9999.9   -9999.9   -9999.9    1203.6
 24    91. 5.0           .0        .0   -9999.9   -9999.9        .0        .0       1.6   -9999.9   -9999.9   -9999.9   -9999.9    1041.8
 25    93. 5.0           .0        .0   -9999.9   -9999.9        .0        .0        .0   -9999.9   -9999.9   -9999.9   -9999.9     753.4
 26    95. 5.0           .0        .0   -9999.9   -9999.9        .0        .0        .0   -9999.9   -9999.9   -9999.9   -9999.9     455.0
 27    97. 5.0           .0        .0   -9999.9   -9999.9        .0        .0        .0   -9999.9   -9999.9   -9999.9   -9999.9     229.3
 28    99. 5.0           .0        .0   -9999.9   -9999.9        .0        .0        .0   -9999.9   -9999.9   -9999.9   -9999.9      96.4
 29   101. 5.0           .0        .0   -9999.9   -9999.9        .0        .0        .0   -9999.9   -9999.9   -9999.9   -9999.9      33.8
 30   103. 5.0           .0        .0   -9999.9   -9999.9        .0        .0        .0   -9999.9   -9999.9   -9999.9   -9999.9       9.9
```

Figure 9. (continued).

## ERROR MESSAGES AND REMEDIAL ACTION

TUPOS-P can generate 28 error messages. Each of these terminates program execution. Table 4 lists each error message, along with its description and suggested corrective action. The table is ordered on the condition code indicator, ICOND.

ICOND is used to indicate if an error is detected in the input data which would preclude model execution. A nonzero value is assigned to ICOND when an input error is detected. The first 3 digits of ICOND indicate the module in which the error occurred; the last 2 digits indicate the relative position within the module. For instance, if ICOND = 21001 then the error occurred in subroutine TP210 at assignment 1 of ICOND.

TABLE 4. ERROR MESSAGES AND REMEDIAL ACTION.

| | |
|---|---|
| ICOND: | 21001 |
| MESSAGE: | *** VALID VALUES FOR IFILE ARE 0 OR 1.<br>*** USER INPUT IFILE = xxxx<br>*** EXECUTION TERMINATED, CONDITION CODE = 21001 |
| DESCRIPTION: | IFILE must be either zero or one. The user tried to input a value other than zero or one. |
| ACTION: | Modify input stream so that IFILE is equal to zero or one. |
| ICOND: | 21003 |
| MESSAGE: | *** THE NUMBER OF SIGNIFICANT POINT SOURCES (NSIGP) WAS FOUND TO EXCEED THE LIMIT (25).<br>*** THE USER TRIED TO INPUT xxx SOURCES.<br>*** EXECUTION TERMINATED, CONDITION CODE = 21003 |
| DESCRIPTION: | The number of significant sources, as specified by the user, is more than 25. |
| ACTION: | Change NSIGP on record type 4A to 25 or less. |

(continued)

TABLE 4 (continued)

| | |
|---|---|
| ICOND: | 21004 |
| MESSAGE: | *** USER INDICATED AN HOURLY CONCENTRATION FILE IS TO BE READ (I.E., IFILE = 0).<br>*** HOWEVER, USER WANTS xxxx SIGNIFICANT SOURCES.<br>*** EXECUTION TERMINATED, CONDITION CODE = 21004 |
| DESCRIPTION: | In order to consider significant sources, a partial concentration file must be read. |
| ACTION: | Attach a partial concentration file to FORTRAN unit 9 or set NSIGP to zero. |
| ICOND: | 21005 |
| MESSAGE: | *** CHECK OPTION LIST (I.E., RECORD TYPE 6).<br>*** OPTION INPUT VARIABLES SHOULD BE EITHER 0 OR 1.<br>*** EXECUTION TERMINATED, CONDITION CODE = 21005 |
| DESCRIPTION: | User input a value other than zero or one for an option. |
| ACTION: | Modify values on record type 6 to zero or one. |
| ICOND: | 21006 |
| MESSAGE: | *** USER INDICATED THE SIGNIFICANT SOURCE OPTION WAS TO BE EMPLOYED (IOPS = 1)<br>*** HOWEVER, USER WANTS xxxx SIGNIFICANT SOURCES.<br>*** EXECUTION TERMINATED, CONDITION CODE = 21006 |
| DESCRIPTION: | The significant source option has been turned on, but the value of NSIGP is zero or less. |
| ACTION: | Modify NSIGP on record type 4A or set IOPS on record type 6 to zero. |

(continued)

TABLE 4 (continued)

| | |
|---|---|
| ICOND: | 21007 |
| MESSAGE: | *** IOPDHC AND IOPDHS CANNOT BOTH EQUAL ZERO.<br>*** EXECUTION TERMINATED, CONDITION CODE = 21007 |
| DESCRIPTION: | The user cannot get both hourly summaries and hourly contributions in a single execution. |
| ACTION: | Set either IOPDHC or IOPDHS to one. |
| ICOND: | 21008 |
| MESSAGE: | *** USER TRIED TO SPECIFY xxxx SIGNIFICANT SOURCES, BUT IS ONLY ALLOWING xxxx TOTAL SIGNIFICANT SOURCES IN THIS RUN.<br>*** EXECUTION TERMINATED, CONDITION CODE = 21008 |
| DESCRIPTION: | Variable INPT was found to be greater than NSIGP. |
| ACTION: | Increase NSIGP (not to exceed 25) or decrease the value of INPT to be equal or less than NSIGP. Make sure the number of entries in array MPS matches the value of INPT. |
| ICOND: | 21009 |
| MESSAGE: | *** THE INPUT SIGNIFICANT SOURCE NUMBER WAS FOUND TO EQUAL ZERO.<br>*** EXECUTION TERMINATED, CONDITION CODE = 21009 |
| DESCRIPTION: | A source number in the significant source list was found to equal zero. |
| ACTION: | Modify record type 7. Make sure there are exactly INPT source numbers in the significant source list. |

(continued)

TABLE 4 (continued)

| | |
|---|---|
| ICOND: | 22001 |
| MESSAGE: | *** INCORRECT FILE ATTACHED TO FORTRAN UNIT 9.<br>*** EXECUTION TERMINATED, CONDITION CODE = 22001 |
| DESCRIPTION: | The first record read from the concentration file must contain a 12 or 14 to indicate it is a proper file. The first record read did not contain a 12 or 14. |
| ACTION: | Attach the proper file to FORTRAN unit 9 in the job stream. |
| ICOND: | 22002 |
| MESSAGE: | *** HOURLY CONCENTRATION FILE IS BEING READ (I.E., IFLAG = 12).<br>*** HOWEVER, THE USER INDICATED A PARTIAL CONCENTRATION FILE WAS TO BE READ (I.E., IFILE = 1).<br>*** EXECUTION TERMINATED, CONDITION CODE = 22002 |
| DESCRIPTION: | The flag at the top of the concentration file indicates it contains hourly concentrations. However, the user indicated, via input variable IFILE (record type 4A), that a partial concentration file was to be read. |
| ACTION: | Attach the proper file to FORTRAN unit 9 or set IFILE to zero. |
| ICOND: | 22003 |
| MESSAGE: | *** PARTIAL CONCENTRATION FILE IS BEING READ (I.E., IFLAG = 14).<br>*** HOWEVER, THE USER INDICATED AN HOURLY CONCENTRATION FILE WAS TO BE READ (I.E., IFILE = 0).<br>*** EXECUTION TERMINATED, CONDITION CODE = 22003 |

(continued)

## TABLE 4 (continued)

| | |
|---|---|
| DESCRIPTION: | The flag at the top of the concentration file indicates it contains partial concentrations. However, the user indicated, via input variable IFILE (record type 4A), that an hourly concentration file was to be read. |
| ACTION: | Attach the proper file to FORTRAN unit 9 or set IFILE to one. |
| ICOND: | 22004 to 22007 |
| MESSAGE: | *** ID FROM MET FILE USED TO GENERATE CONCENTRATION FILE IS: xxxxxxxx yyyyyy zzzzzz<br>*** EXPECTED ID IS: xxxxxxxx yyyyyy zzzzzz<br>*** EXECUTION TERMINATED, CONDITION CODE = 22004 to 22007 |
| DESCRIPTION: | The meteorology file identifier at the top of the concentration file does not match that provided on input. |
| ACTION: | Substitute the proper concentration file in the job stream or change the identifier on record type 5 to match that in the concentration file. |
| ICOND: | 22008 |
| MESSAGE: | *** CONCENTRATION FILE CONTAINS xxxx CONCENTRATIONS.<br>*** USER IS EXPECTING yyyy CONCENTRATIONS.<br>*** EXECUTION TERMINATED, CONDITION CODE = 22008 |
| DESCRIPTION: | The pollutant considered by the user does not match the pollutant contained in the concentration file. |
| ACTION: | Substitute the proper concentration file in the job stream or modify the pollutant identifier on record type 4A. |

(continued)

TABLE 4 (continued)

| | |
|---|---|
| ICOND: | 22009 |
| MESSAGE: | *** SYSTEM ERROR OCCURRED READING HEADER RECORDS IN CONCENTRATION FILE.<br>*** EXECUTION TERMINATED, CONDITION CODE = 22009 |
| DESCRIPTION: | An error occurred on reading a header record in the concentration file. |
| ACTION: | Check the header records of the file. Make sure the proper file is attached to unit 9 in job stream. |
| ICOND: | 22010 |
| MESSAGE: | *** END-OF-FILE OCCURRED READING HEADER RECORDS IN CONCENTRATION FILE.<br>*** EXECUTION TERMINATED, CONDITION CODE = 22010 |
| DESCRIPTION: | The concentration file is empty or near empty. |
| ACTION: | Substitute the proper concentration file in the job stream. |
| ICOND: | 24001 |
| MESSAGE: | *** YEAR INPUT (yyyy) IS NOT WITHIN RANGE OF 60-99.<br>*** EXECUTION TERMINATED, CONDITION CODE = 24001 |
| DESCRIPTION: | The year must be within the period 1960-1999. |
| ACTION: | Modify starting year within the input stream. |
| ICOND: | 24001 |
| MESSAGE: | *** JULIAN DAY INPUT (dddd) IS NOT WITHIN RANGE OF 1-366.<br>*** EXECUTION TERMINATED, CONDITION CODE = 24001 |
| DESCRIPTION: | A valid Julian day must be a positive number not greater than 366. |
| ACTION: | Modify starting Julian day within the input stream. |

(continued)

TABLE 4 (continued)

---

ICOND: 24001

MESSAGE: *** HOUR INPUT (hhhh) IS NOT WITHIN RANGE OF 1-24.
*** EXECUTION TERMINATED, CONDITION CODE = 24001

DESCRIPTION: The starting hour must be a 2-digit number in the range 1-24.

ACTION: Modify starting hour within the input stream.

---

ICOND: 24001

MESSAGE: *** JULIAN DAY INPUT (dddd) CANNOT BE USED FOR YEAR yy; THIS IS NOT A LEAP YEAR.
*** EXECUTION TERMINATED, CONDITION CODE = 24001

DESCRIPTION: The starting year is not a leap year therefore the starting Julian day cannot equal 366.

ACTION: Modify Julian day within the input stream.

---

ICOND: 24002

MESSAGE: *** COMMON SEQUENTIAL HOUR INPUT (xxxxxxx) IS NOT WITHIN THE REQUIRED RANGE FOR CONVERSION TO DATES BETWEEN YEARS 60 AND 99.
*** EXECUTION TERMINATED, CONDITION CODE = 24002

DESCRIPTION: The summary period goes beyond December 31, 1999. This summary is outside the acceptable date range.

ACTION: Reduce the summary length on record type 4A.

---

ICOND: 24003

MESSAGE: *** ERROR READING CONCENTRATION FILE (UNIT 9).
*** EXECUTION TERMINATED, CONDITION CODE = 24003

DESCRIPTION: The concentration file does not include the summary start date.

ACTION: Check the concentration file and make sure it is complete for the summary period.

(continued)

TABLE 4 (continued)

| | |
|---|---|
| ICOND: | 24004 |
| MESSAGE: | *** SYSTEM ERROR ON READING INPUT FOR NEXT SUMMARY PERIOD.<br>*** EXECUTION TERMINATED, CONDITION CODE = 24004 |
| DESCRIPTION: | An error occurred on reading the summary start date and duration for the next run. |
| ACTION: | Make sure record type 8 has sufficient values and they are of the proper data type. |

| | |
|---|---|
| ICOND: | 34001 |
| MESSAGE: | *** THE CONCENTRATION FILE WAS EXHAUSTED WITHOUT FINDING DATA FOR THE HOUR REQUESTED.<br>*** EXECUTION TERMINATED, CONDITION CODE = 34001 |
| DESCRIPTION: | The concentration file was exhausted without finding data for the hour requested. |
| ACTION: | Check the concentration file and make sure it is complete for the summary period. |

| | |
|---|---|
| ICOND: | 34002 |
| MESSAGE: | *** YEAR INPUT (yyyy) IS NOT WITHIN RANGE OF 60-99.<br>*** EXECUTION TERMINATED, CONDITION CODE = 34002 |
| DESCRIPTION: | The year must be within the period 1960-1999. |
| ACTION: | Check dates in the concentration file. |

| | |
|---|---|
| ICOND: | 34002 |
| MESSAGE: | *** JULIAN DAY INPUT (dddd) IS NOT WITHIN RANGE OF 1-366.<br>*** EXECUTION TERMINATED, CONDITION CODE = 34002 |
| DESCRIPTION: | A valid Julian day must be a positive number not greater than 366. |
| ACTION: | Check dates in the concentration file. |

(continued)

TABLE 4 (continued)

| | |
|---|---|
| ICOND: | 34002 |
| MESSAGE: | *** HOUR INPUT (hhhh) IS NOT WITHIN RANGE OF 1-24.<br>*** EXECUTION TERMINATED, CONDITION CODE = 34002 |
| DESCRIPTION: | A valid hour must be a 2-digit number in the range 1-24. |
| ACTION: | Check dates in the concentration file. |
| ICOND: | 34002 |
| MESSAGE: | *** JULIAN DAY INPUT (dddd) CANNOT BE USED FOR YEAR yy; THIS IS NOT A LEAP YEAR.<br>*** EXECUTION TERMINATED, CONDITION CODE = 34002 |
| DESCRIPTION: | The year read is not a leap year therefore the Julian day read cannot equal 366. |
| ACTION: | Check dates in the concentration file. |
| ICOND: | 41001 |
| MESSAGE: | *** SYSTEM ERROR OCCURRED WHEN READING HOURLY CONCENTRATION RECORD.<br>*** EXECUTION TERMINATED, CONDITION CODE = 41001 |
| DESCRIPTION: | An error occurred on reading an hourly record from the concentration file. |
| ACTION: | Check the concentration file. |

# REFERENCES

Pierce, T. E. and D. B. Turner. 1980. User's Guide for MPTER -- A Multiple Point Gaussian Dispersion Algorithm with Optional Terrain Adjustmants. EPA-600/8-80-016. U.S. Environmental Protection Agency, Research Triangle Park, NC. 247 pp.

Turner, D. B., T. Chico, and J. A. Catalano. 1986. TUPOS -- A Multiple Source Gaussian Dispersion Algorithm Using On-Site Turbulence Data. EPA-600/8-86-010. U.S. Environmental Protection Agency, Research Triangle Park, NC. 171 pp.

# APPENDIX

## LISTING OF FORTRAN SOURCE CODE FOR TUPOS-P

The source code listing of TUPOS-P follows. The program consists of a main module and 17 subroutines.

```
C                 TUPOS-P-1.0  (VERSION 85092)
C                 A POSTPROCESSOR IN
C                 SECTION 2.  NON-GUIDELINE MODELS
C                 IN UNAMAP (VERSION 6) JUL 86
C                 SOURCE:UNAMAP FILE ON EPA'S UNIVAC 1110, RTP, NC.
C * * *  PROGRAM ABSTRACT -- TUPOS-P
C
C           TUPOS-P IS A POSTPROCESSOR PROGRAM FOR SUMMARIZING CON-
C        CENTRATION FILES PRODUCED BY THE AIR QUALITY DISPERSION MODEL
C        TUPOS (TURNER ET AL., 1985).  THE PROGRAM READS EITHER HOURLY
C        OR  HOURLY PARTIAL CONCENTRATION FILES AND PROVIDES THE
C        FOLLOWING OUTPUT:
C           -  HOURLY CONCENTRATION SUMMARIES,
C           -  AVERAGING PERIOD CONCENTRATION SUMMARIES, AND
C           -  HIGH-FIVE CONCENTRATION TABLE FOR FIVE AVERAGING TIMES
C                 (1-HR, 3-HRS, 8-HRS, 24-HRS, AND AN AVERAGING TIME
C                 SELECTED BY THE USER).
C        IF THE CONCENTRATION FILE BEING READ CONSISTS OF PARTIAL CON-
C        TRIBUTIONS, THEN THE USER MAY REQUEST HOURLY CONTRIBUTION
C        SUMMARIES AND AVERAGING PERIOD CONTRIBUTION SUMMARIES.  MUCH
C        OF THE PRINTED OUTPUT IS OPTIONALLY AVAILABLE SO THAT UNNEEDED
C        OUTPUT VOLUME IS AVOIDED.
C
C * * *  REFERENCES
C        TURNER, D. B., T. CHICO, AND J. A. CATALANO. 1986. TUPOS -- A
C          MULTIPLE SOURCE GAUSSIAN DISPERSION ALGORITHM USING ON-SITE
C          TURBULENCE DATA. EPA/600/ 8-86/010. U. S. ENVIRONMENTAL
C          PROTECTION AGENCY, RESEARCH TRIANGLE PARK, NC.  171 PP.
C
C        TURNER, D. B., T. CHICO, AND J. A. CATALANO. 1986. TUPOS-P --
C          A PROGRAM FOR ANALYZING HOURLY AND PARTIAL CONCENTRATION
C          FILES PRODUCED BY TUPOS.  EPA/600/ 8-86/012. U. S. ENVIRON-
C          MENTAL PROTECTION AGENCY, RESEARCH TRIANGLE PARK NC. 106PP.
C * * *  AUTHORS OF CODE
C        D. BRUCE TURNER* AND TOM CHICO#
C          *ON ASSIGNMENT TO EPA FROM NOAA, DEPT OF COMMERCE.
C          #AEROCOMP, INC.
C
C * * *  INPUT/OUTPUT INFORMATION
C
C        FORTRAN     DATA SET                        I/O UNIT
C         UNIT
C           5        CONTROL INPUT                   READER OR DISK
C           6        OUTPUT                          PRINTER OR DISK
C           9        HOURLY OR PARTIAL CONCEN-       DISK OR TAPE
C                      TRATIONS
C
C * * *  STRUCTURE AND MODULE SUMMARY
C
C        TP100 - TUPOS POSTPROCESSOR
C                TP210 - READ CONTROL INPUTS
C                TP220 - GET CONCENTRATION FILE HEADER INFORMATION
C                TP230 - PROCESS INPUT DATA
C                        TP310 - PRINT GENERAL INFORMATION
C                        TP320 - FILL-IN SIGNIFICANT POINT SOURCE ARRAY
C                        TP330 - PRINT RECEPTOR INFORMATION
C                TP240 - PERFORM AVERAGING
C                        CHRON - DATE/TIME TO INTEGER
C                        ICHRON - INTEGER TO DATE/TIME
C                        TP340 - GET CONCENTRATION DATA
C                                TP410 - READ CONCENTRATION FILE
C                                CHRON - DATE/TIME TO INTEGER
C                        TP350 - ACCUMULATE SUMS
C                        TP360 - PRINT HOURLY SUMMARIES
C                        TP370 - UPDATE HI-5 TABLES
C                                TP420 - RANK CONCENTRATIONS
C                        TP380 - PRINT AVERAGING PERIOD SUMMARIES
C                        TP390 - PRINT HI-5 TABLE
C
C
```

```
      PARAMETER (NDMAX=40,NPTMAX=25,NREMAX=180)                         TPP00710
      DIMENSION METID(2)                                                TPP00720
      COMMON /RUNCOM/CONTWO,CELM,HAFL,CONTER(4),IYRS,IDYS,IHRS,IHLIM,   TPP00730
     1               IOPT,IOPB,IOPD,IOPG,IOPM,IOPQ,IOPS,IOPR,IOPDHC,    TPP00740
     2               IOPDPC,IOPDHS,IOPDPH,IOPDAC,IOPDAS,IOPDHI,IFILE,   TPP00750
     3               NPER,NAVG,HEAD1(20),HEAD2(20),HEAD3(20),LINE1(20), TPP00760
     4               LINE2(20),LINE3(20),NPOL                           TPP00770
      COMMON /METCOM/METNAM(2),MDATA,MDATB,ND,DESC(18,NDMAX)            TPP00780
      COMMON /SORCOM/D(NPTMAX),PNAME(3,NPTMAX),PSH(NPTMAX),QJ(NPTMAX),  TPP00790
     1               QELEV(NPTMAX),QEAST(NPTMAX),QNORD(NPTMAX),         TPP00800
     2               SIGP(NPTMAX),TS(NPTMAX),VS(NPTMAX),HSAV(NPTMAX),   TPP00810
     3               DSAV(NPTMAX),NPTLIM,NSIGP,INPT,IMPS(NPTMAX),       TPP00820
     4               IPSIGS(NPTMAX),MPS(NPTMAX)                         TPP00830
      COMMON /RECCOM/ELR(NREMAX),PARTC(NREMAX,NPTMAX),PCHI(NREMAX),     TPP00840
     1               PHCHI(NREMAX),PHSIGS(NREMAX,26),PSIGS(NREMAX,26),  TPP00850
     2               RNAME(2,NREMAX),RREC(NREMAX),SREC(NREMAX),         TPP00860
     3               STAR(2,NREMAX),ZR(NREMAX),NRELIM                   TPP00870
      COMMON /TABCOM/CONC(NREMAX,5),HMAXA(5,NREMAX,5),SUM(NREMAX),      TPP00880
     1               HSAV12(NPTMAX,12),DSAV12(NPTMAX,12),               TPP00890
     2               CONC12(NREMAX,12),NA3,NA8,NA24,NAX,NAV5,NAVT,NP3,  TPP00900
     3               NP8,NP24,NPX,NPER3,NPER8,NPER24,NPERX,NTAH,NVAL3,  TPP00910
     4               NVAL8,NVAL24,NVALX,NSUPL(5,NREMAX,5),NTIME(5),     TPP00920
     5               IYR12(12),IDY12(12),LH12(12)                       TPP00930
      COMMON /INOUT/ IN,IO,ICF                                          TPP00940
      DATA NTIME/1,3,8,24,0/                                            TPP00950
C                                                                       TPP00960
C           WRITE HEADER.                                               TPP00970
C                                                                       TPP00980
      WRITE (6,1234)                                                    TPP00990
 1234 FORMAT ('1',21X,'TUPOS-P-1.0  (VERSION 85092)'/                   TPP01000
     1 22X,'A POSTPROCESSOR IN'/                                        TPP01010
     2 22X,'SECTION 2.  NON-GUIDELINE MODELS'/                          TPP01020
     3 22X,'IN UNAMAP (VERSION 6) JUL 86'/                              TPP01030
     4 22X,'SOURCE: UNAMAP FILE ON EPA''S UNIVAC 1110, RTP, NC.')       TPP01040
C                                                                       TPP01050
C           INITIALIZE.                                                 TPP01060
C                                                                       TPP01070
      IN = 5                                                            TPP01080
      IO = 6                                                            TPP01090
      ICF = 9                                                           TPP01100
      ICOND = 0                                                         TPP01110
C                                                                       TPP01120
C           READ CONTROL INPUTS.                                        TPP01130
C                                                                       TPP01140
      CALL TP210(JPOL,METID,MDATAC,MDATBC,ICOND)                        TPP01150
      IF (ICOND .EQ. 0) GO TO 100                                       TPP01160
      WRITE(IO,1000) ICOND                                              TPP01170
      GO TO 999                                                         TPP01180
C                                                                       TPP01190
C           GET CONCENTRATION FILE HEADER INFORMATION.                  TPP01200
C                                                                       TPP01210
  100 CALL TP220(JPOL,METID,MDATAC,MDATRC,ICOND)                        TPP01220
      IF (ICOND .EQ. 0) GO TO 200                                       TPP01230
      WRITE(IO,1000) ICOND                                              TPP01240
      GO TO 999                                                         TPP01250
C                                                                       TPP01260
C           PROCESS CONTROL INPUT AND CONCENTRATION FILE HEADER         TPP01270
C            INFORMATION.                                               TPP01280
C                                                                       TPP01290
  200 CALL TP230                                                        TPP01300
C                                                                       TPP01310
C           PERFORM AVERAGING.                                          TPP01320
C                                                                       TPP01330
      CALL TP240(ICOND)                                                 TPP01340
      IF (ICOND .EQ. 0) GO TO 300                                       TPP01350
      WRITE(IO,1000) ICOND                                              TPP01360
      GO TO 999                                                         TPP01370
C                                                                       TPP01380
C           SUCCESSFUL EXECUTION.                                       TPP01390
C                                                                       TPP01400
```

```
  300 WRITE(IO,1010)
C
  999 STOP
C
C         FORMAT STATEMENTS.
C
 1000 FORMAT('0*** EXECUTION TERMINATED, CONDITION CODE = ',I5)
 1010 FORMAT('0*** NORMAL TERMINATION ***')
      END
      SUBROUTINE TP210(JPOL,METID,MDATAC,MDATBC,ICOND)
C        210-READ-CONTROL-INPUTS
C
C        ARGUMENT LIST:
C          OUTPUT:  JPOL    - 4 CHARACTER POLLUTANT ID
C                   METID   - 8 CHARACTER IDENTIFIER
C                   MDATAC  - MO DAY YR OF DATA CREATION (6 DIGITS)
C                   MDATBC  - HR MIN SEC OF DATA CREATION (6 DIGITS)
C                   ICOND   - CONDITION INDICATOR (0 = NO ERROR)
C
C        CALLING ROUTINES:
C          MAIN
C
C        DESCRIPTION:
C          THIS MODULE READS ALL THE PROGRAM CONTROL INFORMATION FROM
C          FORTRAN UNIT 5 AND PERFORMS SOME ERROR CHECKING.
C
C * * * * * * * * * * CONTROL INPUT DATA (UNIT 5) * * * * * * * * * * *
C
C***   RECORD TYPES 1-3:  ALPHANUMERIC DATA FOR TITLES.  FORMAT (20A4)
C
C          HEAD1     -  80-CHARACTER TITLE
C          HEAD2     -  80-CHARACTER TITLE
C          HEAD3     -  80-CHARACTER TITLE
C
C***   RECORD TYPE 4A:  CONTROL.     FORMAT (FREE)
C
C          IYRS      -  2-DIGIT YEAR FOR THIS SIMULATION
C          IDYS      -  STARTING JULIAN DAY FOR THIS SIMULATION
C          IHRS      -  STARTING HOUR FOR THIS SIMULATION
C          IHLIM     -  THE TOTAL NUMBER OF HOURS TO BE SIMULATED
C          IFILE     -  CONCENTRATION FILE INDICATOR:  0 FOR HOURLY CONCEN-
C                         TRATIONS AND 1 FOR HOURLY PARTIAL CONCENTRATIONS
C          NSIGP     -  NUMBER OF SOURCES FOR WHICH CALCULATED CONTRIBU-
C                         TIONS WILL BE DISPLAYED
C
C***   RECORD TYPE 4B.     FORMAT (FREE)
C
C          NPER      -  NUMBER OF AVERAGING PERIODS TO BE RUN
C          NAVG      -  NUMBER OF HOURS IN AN AVERAGING PERIOD
C          NAV5      -  ADDITIONAL AVERAGING TIME FOR HIGH-5 TABLE
C          NVAL3     -  NUMBER OF HOURS REQUIRED TO HAVE A VALID 3-HR
C                         PERIOD
C          NVAL8     -  NUMBER OF HOURS REQUIRED TO HAVE A VALID 8-HR
C                         PERIOD
C          NVAL24    -  NUMBER OF HOURS REQUIRED TO HAVE A VALID 24-HR
C                         PERIOD
C          NVALX     -  NUMBER OF HOURS REQUIRED TO HAVE A VALID ADDITIONAL
C                         PERIOD OF LENGTH NAV5 HOURS
C
C***   RECORD TYPE 5:  MET DATA IDENTIFIERS.     FORMAT (2A4,2I6)
C
C          JPOL      -  4 CHARACTER POLLUTANT NAME
C          METID     -  8 CHARACTER IDENTIFIER
C          MDATAC    -  MO DAY YR OF DATA CREATION (6 DIGITS)
C          MDATBC    -  HR MIN SEC OF DATA CREATION (6 DIGITS)
C
C***   RECORD TYPE 6:  TECHNICAL AND PRINT OPTIONS.     FORMAT (FREE)
C
C          IOPS      -  SPECIFY SIGNIFICANT SOURCES
```

```
C          IOPDHC   -  DELETE HOURLY CONTRIBUTIONS
C          IOPDPC   -  DELETE FINAL PLUME HEIGHT AND DISTANCE TO FINAL
C                        RISE ON HOURLY CONTRIBUTIONS
C          IOPDHS   -  DELETE HOURLY SUMMARY
C          IOPDPH   -  DELETE FINAL PLUME HEIGHT AND DISTANCE TO FINAL
C                        RISE ON HOURLY SUMMARY
C          IOPDAC   -  DELETE AVERAGING-PERIOD CONTRIBUTIONS
C          IOPDAS   -  DELETE AVERAGING-PERIOD SUMMARY
C          IOPDHI   -  DELETE AVERAGE CONCENTRATIONS AND HI-5 TABLE
C
C***    RECORD TYPE 7:   SPECIFIED SIGNIFICANT SOURCES.     FORMAT (FREE)
C                        READ IF IOPS = 1
C
C          INPT     -  NUMBER OF USER-SPECIFIED SIGNIFICANT SOURCES
C          MPS      -  POINT SOURCE NUMBER USER WANTS CONSIDERED
C                        SIGNIFICANT
C
      PARAMETER (NPTMAX=25,NREMAX=180)
      DIMENSION METID(2)
      COMMON /RUNCOM/CONTWO,CELM,HAFL,CONTER(4),IYRS,IDYS,IHRS,IHLIM,
     1               IOPT,IOPB,IOPD,IOPG,IOPM,IOPQ,IOPS,IOPR,IOPDHC,
     2               IOPDPC,IOPDHS,IOPDPH,IOPDAC,IOPDAS,IOPDHI,IFILE,
     3               NPER,NAVG,HEAD1(20),HEAD2(20),HEAD3(20),LINE1(20),
     4               LINE2(20),LINE3(20),NPOL
      COMMON /SORCOM/D(NPTMAX),PNAME(3,NPTMAX),PSH(NPTMAX),QJ(NPTMAX),
     1               QELEV(NPTMAX),QEAST(NPTMAX),QNORD(NPTMAX),
     2               SIGP(NPTMAX),TS(NPTMAX),VS(NPTMAX),HSAV(NPTMAX),
     3               DSAV(NPTMAX),NPTLIM,NSIGP,INPT,IMPS(NPTMAX),
     4               IPSIGS(NPTMAX),MPS(NPTMAX)
      COMMON /TABCOM/CONC(NREMAX,5),HMAXA(5,NREMAX,5),SUM(NREMAX),
     1               HSAV12(NPTMAX,12),DSAV12(NPTMAX,12),
     2               CONC12(NREMAX,12),NA3,NA8,NA24,NAX,NAV5,NAVT,NP3,
     3               NP8,NP24,NPX,NPER3,NPER8,NPER24,NPERX,NTAH,NVAL3,
     4               NVAL8,NVAL24,NVALX,NSUPL(5,NREMAX,5),NTIME(5),
     5               IYR12(12),IDY12(12),LH12(12)
      COMMON /INOUT/ IN,IO,ICF
C
C          READ RECORD TYPES 1-3.
C
      READ(IN,1000) HEAD1,HEAD2,HEAD3
C
C          READ RECORD TYPE 4A AND PERFORM INPUT SCREENING.
C
      READ(IN,*) IYRS,IDYS,IHRS,IHLIM,IFILE,NSIGP
      IF ((IFILE .EQ. 0) .OR. (IFILE .EQ. 1)) GO TO 10
      WRITE(IO,2000) IFILE
      ICOND = 21001
      GO TO 999
   10 IF (NSIGP .LE. 25) GO TO 30
      WRITE(IO,2020) NSIGP
      ICOND = 21003
      GO TO 999
   30 IF (IFILE .EQ. 1) GO TO 40
      IF (NSIGP .EQ. 0) GO TO 40
C          ERROR:  IFILE = 0 BUT NSIGP > 0
      WRITE(IO,2030) IFILE,NSIGP
      ICOND = 21004
C
C          READ RECORD TYPE 4B.
C
   40 READ(IN,*) NPER,NAVG,NAV5,NVAL3,NVAL8,NVAL24,NVALX
C
C          READ RECORD TYPE 5.
C
      READ(IN,1010) JPOL,METID,MDATAC,MDATBC
C
C          READ RECORD TYPE 6 AND PERFORM INPUT SCREENING.
C
      READ(IN,*) IOPS,IOPDHC,IOPDPC,IOPDHS,IOPDPH,IOPDAC,IOPDAS,IOPDHI
      IF ((IOPS .NE. 0) .AND. (IOPS .NE. 1)) ICOND = 21005
      IF ((IOPDHC .NE. 0) .AND. (IOPDHC .NE. 1)) ICOND = 21005
      IF ((IOPDPC .NE. 0) .AND. (IOPDPC .NE. 1)) ICOND = 21005
      IF ((IOPDHS .NE. 0) .AND. (IOPDHS .NE. 1)) ICOND = 21005
      IF ((IOPDPH .NE. 0) .AND. (IOPDPH .NE. 1)) ICOND = 21005
      IF ((IOPDAC .NE. 0) .AND. (IOPDAC .NE. 1)) ICOND = 21005
      IF ((IOPDAS .NE. 0) .AND. (IOPDAS .NE. 1)) ICOND = 21005
      IF ((IOPDHI .NE. 0) .AND. (IOPDHI .NE. 1)) ICOND = 21005
      IF (ICOND .EQ. 0) GO TO 50
      WRITE(IO,2040)
      GO TO 999
   50 IF (NSIGP .GT. 0) GO TO 60
      IOPDHC = 1
      IOPDPC = 1
      IOPDAC = 1
      IF (IOPS .EQ. 0) GO TO 60
C         ERROR:  NSIGP = 0 BUT IOPS = 1
      WRITE(IO,2050) IOPS,NSIGP
      ICOND = 21006
      GO TO 999
   60 IF ((IOPDHC .EQ. 0) .AND. (IOPDHS .EQ. 0)) ICOND = 21007
C         CANNOT GET BOTH HOURLY CONTRIBUTIONS AND HOURLY SUMMARIES.
      IF (ICOND .EQ. 0) GO TO 70
      WRITE(IO,2060)
      GO TO 999
C
C         READ RECORD TYPE 7 AND PERFORM INPUT SCREENING.
C
   70 IF (IOPS .EQ. 0) GO TO 999
      READ(IN,*) INPT,(MPS(I), I = 1,INPT)
      IF (INPT .LE. NSIGP) GO TO 80
      WRITE(IO,2070) INPT,NSIGP
      ICOND = 21008
   80 DO 90 I = 1,INPT
         IF (MPS(I) .EQ. 0) ICOND = 21009
   90 CONTINUE
      IF (ICOND .EQ. 21009) WRITE(IO,2080)
C
  999 RETURN
C
C         INPUT FORMATS.
C
 1000 FORMAT(20A4/20A4/20A4)
 1010 FORMAT(3A4,2I6)
C
C         ERROR STATEMENT FORMATS.
C
 2000 FORMAT('0*** VALID VALUES FOR IFILE ARE 0 OR 1.',/,
     1       ' *** USER INPUT IFILE = ',I4)
 2020 FORMAT('0*** THE NUMBER OF SIGNIFICANT POINT SOURCES (NSIGP) ',
     1      'WAS FOUND TO EXCEED THE LIMIT (25).',/,
     2       ' *** THE USER TRIED TO INPUT ',I3,' SOURCES.')
 2030 FORMAT('0*** USER INDICATED AN HOURLY CONCENTRATION FILE IS TO ',
     1      'BE READ (I.E., IFILE =',I2,').',/,
     2       ' *** HOWEVER, USER WANTS ',I4,' SIGNIFICANT SOURCES.')
 2040 FORMAT('0*** CHECK OPTION LIST (I.E., RECORD TYPE 6).',/,
     1       ' *** OPTION INPUT VARIABLES SHOULD BE EITHER 0 OR 1.')
 2050 FORMAT('0*** USER INDICATED THE SIGNIFICANT SOURCE OPTION WAS ',
     1      'TO BE EMPLOYED (IOPS =',I2,')',/,
     2       ' *** HOWEVER, USER WANTS ',I4,' SIGNIFICANT SOURCES.')
 2060 FORMAT('0*** IOPDHC AND IOPDHS CANNOT BOTH EQUAL ZERO.')
 2070 FORMAT('0*** USER TRIED TO SPECIFY ',I4,' SIGNIFICANT SOURCES, ',
     1      'BUT IS ONLY ALLOWING ',I4,' TOTAL SIGNIFICANT ',
     2      'SOURCES IN THIS RUN.')
 2080 FORMAT('0*** THE INPUT SIGNIFICANT SOURCE NUMBER WAS FOUND TO ',
     1      'EQUAL ZERO.')
      END
      SUBROUTINE TP220(JPOL,METID,MDATAC,MDATBC,ICOND)
C         220-GET-CONCENTRATION-FILE-HEADER-INFORMATION
C
C         ARGUMENT LIST:
```

```
C          INPUT:   METID  - 8-CHARACTER IDENTIFIER
C                   MDATAC - MO DAY YR OF DATA CREATION (6 DIGITS)
C                   MDATBC - HR MIN SEC OF DATA CREATION (6 DIGITS)
C          OUTPUT:  ICOND  - CONDITION INDICATOR (0 = NO ERROR)
C
C        CALLING ROUTINES:
C          MAIN
C
C        DESCRIPTION:
C          THIS SUBROUTINE READS ALL THE HEADER INFORMATION AT THE TOP
C          OF THE CONCENTRATION FILE.  ERROR CHECKING IS PERFORMED TO
C          ASSURE THE USER IS ACCESSING THE PROPER FILE.
C
C***  INPUT FILE (UNIT 9) CONCENTRATION FILE HEADER RECORDS.
C
C     RECORD TYPE 1
C        IFLAG          FLAG TO INDICATE TYPE OF CONCENTRATION FILE
C                        (12 = HOURLY CONCENTRATION FILE; 14 = PARTIAL
C                        CONCENTRATION FILE.  ANY OTHER VALUE IS INVALID
C                        AND YIELDS AN ERROR MESSAGE)
C
C     RECORD TYPE 2
C        LINE1          80 ALPHANUMERIC CHARACTERS FOR TITLE
C        LINE2          80 ALPHANUMERIC CHARACTERS FOR TITLE
C        LINE3          80 ALPHANUMERIC CHARACTERS FOR TITLE
C
C     RECORD TYPE 3     (MET FILE HEADER RECORD)
C        METNAM         AN 8 CHARACTER ALPHANUMERIC IDENTIFIER FOR THE MET
C                        DATA.
C        MDATA          DATE-TIME OF DATA CREATION.  MO DAY YR (6 DIGITS).
C        MDATB          DATE-TIME OF DATA CREATION.  HR MIN SEC (6 DIGITS).
C        ND             NUMBER OF 72 CHARACTER ALPHANUMERIC LINES OF
C                        DESCRIPTION
C        DESC           ND LINES OF ALPHANUMERIC INFORMATION (72 CHARACTERS
C                        PER LINE) THAT DESCRIBES THE MET DATA
C
C     RECORD TYPE 4
C        NPOL           4 CHARACTER POLLUTANT NAME
C        CONTWO         MULTIPLIER TO CONVERT USER UNITS TO KILOMETERS
C        CELM           MULTIPLIER TO CONVERT USER HEIGHT UNITS TO METERS
C        HAFL           POLLUTANT HALF-LIFE (SECONDS).  AN ENTRY OF ZERO
C                        CAUSED NO POLLUTANT LOSS.
C        NPTLIM         NUMBER OF POINT SOURCES CONSIDERED
C        NRELIM         NUMBER OF RECEPTORS CONSIDERED
C
C     RECORD TYPE 5
C        IOPT           TERRAIN ADJUSTMENT OPTION
C        IOPB           BUOYANCY-INDUCED DISPERSION OPTION
C        IOPD           STACK DOWNWASH OPTION
C        IOPG           GRADUAL PLUME RISE OPTION
C        IOPM           TEST AGAINST MIXING AT NIGHT
C        IOPQ           HOURLY EMISSIONS INPUT OPTION
C        IOPR           POLAR COORDINATE RECEPTOR OPTION
C
C     RECORD TYPE 6 (READ IF IOPT = 1)
C        CONTER(4)      TERRAIN ADJUSTMENT FACTORS
C
C     RECORD TYPE 7   -  NPTLIM RECORDS (ONE FOR EACH SOURCE)
C        PNAME          12 CHARACTER SOURCE IDENTIFICATION
C        QEAST          EAST COORDINATE OF SOURCE (USER UNITS)
C        QNORD          NORTH COORDINATE OF SOURCE (USER UNITS)
C        QJ(NPT)        EMISSION RATE (G/SEC) FOR POLLUTANT NPOL
C        PSH            PHYSICAL STACK HEIGHT (M)
C        TS             STACK GAS TEMPERATURE (K)
C        D              STACK DIAMETER (M)
C        VS             STACK GAS EXIT VELOCITY (M/SEC)
C        QELEV          STACK BASE GROUND-LEVEL ELEVATION (USER HEIGHT
C                        UNITS)
C        IMPS           ARRAY OF SOURCE NUMBERS IN ORDER OF SIGNIFICANCE
```

```
C     RECORD TYPE 8   -  NRELIM RECORDS (ONE FOR EACH RECEPTOR)         TPP04210
C        RNAME         8 CHARACTER RECEPTOR IDENTIFICATION              TPP04220
C        RREC          EAST COORDINATE OF RECEPTOR (USER UNITS)         TPP04230
C        SREC          NORTH COORDINATE OF RECEPTOR (USER UNITS)        TPP04240
C        ZR            RECEPTOR HEIGHT ABOVE LOCAL GROUND-LEVEL (M)     TPP04250
C        ELR           RECEPTOR GROUND-LEVEL ELEVATION (USER HEIGHT UNITS)TPP04260
C        STAR          FLAG TO INDICATE RECEPTOR STATUS, I.E.,          TPP04270
C                        *   RECEPTOR ELEVATION IS BELOW LOWEST STACK BASETPP04280
C                            ELEVATION                                  TPP04290
C                        **  RECEPTOR ELEVATION IS ABOVE LOWEST STACK TOP TPP04300
C                            ELEVATION.                                 TPP04310
C                                                                       TPP04320
C     RECORD TYPES 1-8 OCCUR ONCE AT THE TOP OF THE FILE.               TPP04330
C                                                                       TPP04340
      PARAMETER (NDMAX=40,NPTMAX=25,NREMAX=180)                         TPP04350
      DIMENSION METID(2)                                                TPP04360
      COMMON /RUNCOM/CONTWO,CELM,HAFL,CONTER(4),IYRS,IDYS,IHRS,IHLIM,   TPP04370
     1               IOPT,IOPB,IOPD,IOPG,IOPM,IOPQ,IOPS,IOPR,IOPDHC,    TPP04380
     2               IOPDPC,IOPDHS,IOPDPH,IOPDAC,IOPDAS,IOPDHI,IFILE,   TPP04390
     3               NPER,NAVG,HEAD1(20),HEAD2(20),HEAD3(20),LINE1(20), TPP04400
     4               LINE2(20),LINE3(20),NPOL                           TPP04410
      COMMON /METCOM/METNAM(2),MDATA,MDATB,ND,DESC(18,NDMAX)            TPP04420
      COMMON /SORCOM/D(NPTMAX),PNAME(3,NPTMAX),PSH(NPTMAX),QJ(NPTMAX),  TPP04430
     1               QELEV(NPTMAX),QEAST(NPTMAX),QNORD(NPTMAX),         TPP04440
     2               SIGP(NPTMAX),TS(NPTMAX),VS(NPTMAX),HSAV(NPTMAX),   TPP04450
     3               DSAV(NPTMAX),NPTLIM,NSIGP,INPT,IMPS(NPTMAX),       TPP04460
     4               IPSIGS(NPTMAX),MPS(NPTMAX)                         TPP04470
      COMMON /RECCOM/ELR(NREMAX),PARTC(NREMAX,NPTMAX),PCHI(NREMAX),     TPP04480
     1               PHCHI(NREMAX),PHSIGS(NREMAX,26),PSIGS(NREMAX,26),  TPP04490
     2               RNAME(2,NREMAX),RREC(NREMAX),SREC(NREMAX),         TPP04500
     3               STAR(2,NREMAX),ZR(NREMAX),NRELIM                   TPP04510
      COMMON /INOUT/ IN,IO,ICF                                          TPP04520
C                                                                       TPP04530
C          READ RECORD TYPE 1 AND PERFORM SCREENING.                    TPP04540
C                                                                       TPP04550
      READ(ICF,ERR=900,END=950) IFLAG                                   TPP04560
      IF ((IFLAG .EQ. 12) .OR. (IFLAG .EQ. 14)) GO TO 10                TPP04570
      WRITE(IO,1000) ICF                                                TPP04580
      ICOND = 22001                                                     TPP04590
      GO TO 999                                                         TPP04600
   10 IF (IFLAG .EQ. 14) GO TO 20                                       TPP04610
      IF (IFILE .EQ. 0) GO TO 30                                        TPP04620
C          IFLAG = 12 BUT IFILE = 1                                     TPP04630
      WRITE(IO,1010) IFLAG,IFILE                                        TPP04640
      ICOND = 22002                                                     TPP04650
      GO TO 999                                                         TPP04660
   20 IF (IFILE .EQ. 1) GO TO 30                                        TPP04670
C          IFLAG = 14 BUT IFILE = 0                                     TPP04680
      WRITE(IO,1020) IFLAG,IFILE                                        TPP04690
      ICOND = 22003                                                     TPP04700
      GO TO 999                                                         TPP04710
C                                                                       TPP04720
C          READ RECORD TYPE 2.                                          TPP04730
C                                                                       TPP04740
   30 READ(ICF,ERR=900,END=950) LINE1,LINE2,LINE3                       TPP04750
C                                                                       TPP04760
C          READ RECORD TYPE 3 AND PERFORM SCREENING.                    TPP04770
C                                                                       TPP04780
      READ(ICF,ERR=900,END=950) METNAM,MDATA,MDATB,ND,                  TPP04790
     1                          ((DESC(I,N), I = 1,18),N = 1,ND)        TPP04800
      IF (METNAM(1) .NE. METID(1)) ICOND = 22004                        TPP04810
      IF (METNAM(2) .NE. METID(2)) ICOND = 22005                        TPP04820
      IF (MDATA .NE. MDATAC) ICOND = 22006                              TPP04830
      IF (MDATB .NE. MDATBC) ICOND = 22007                              TPP04840
      IF (ICOND .EQ. 0) GO TO 40                                        TPP04850
      WRITE(IO,1030) METNAM,MDATA,MDATB,METID,MDATAC,MDATBC             TPP04860
      GO TO 999                                                         TPP04870
C                                                                       TPP04880
C          READ RECORD TYPE 4 AND PERFORM SCREENING.                    TPP04890
C                                                                       TPP04900
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   40 READ(ICF,ERR=900,END=950) NPOL,CONTWO,CELM,HAFL,NPTLIM,NRELIM
      IF (NPOL.EQ.JPOL) GO TO 50
      WRITE(IO,1040) NPOL,JPOL
      ICOND = 22008
      GO TO 999
C
C         READ RECORD TYPE 5.
C
   50 READ(ICF,ERR=900,END=950) IOPT,IOPB,IOPD,IOPG,IOPM,IOPQ,IOPR
C
C         IF IOPT = 1, THEN READ RECORD TYPE 6.
C
      IF (IOPT .EQ. 1) READ(ICF,ERR=900,END=950) CONTER
C
C         READ POINT SOURCE INFORMATION (I.E., RECORD TYPE 7).
C
      DO 60 NPT = 1,NPTLIM
   60 READ(ICF,ERR=900,END=950) (PNAME(I,NPT), I = 1,3),QEAST(NPT),
     1           QNORD(NPT),QJ(NPT),PSH(NPT),TS(NPT),D(NPT),
     2           VS(NPT),QELEV(NPT),IMPS(NPT)
C
C         READ RECEPTOR INFORMATION (I.E., RECORD TYPE 8).
C
      DO 70 NRE = 1,NRELIM
         READ(ICF,ERR=900,END=950) (RNAME(I,NRE), I = 1,2),RREC(NRE),
     1              SREC(NRE),ZR(NRE),ELR(NRE),(STAR(J,NRE), J = 1,2)
   70 CONTINUE
      GO TO 999
C
C                ERROR PROCESSING.
C
  900 WRITE(IO,1050)
      ICOND = 22009
      GO TO 999
  950 WRITE(IO,1060)
      ICOND = 22010
C
  999 RETURN
C
C         FORMAT STATEMENTS.
C
 1000 FORMAT('0*** INCORRECT FILE ATTACHED TO FORTRAN UNIT ',I2,'.')
 1010 FORMAT('0*** HOURLY CONCENTRATION FILE IS BEING READ (I.E., ',
     1       'IFLAG = ',I2,').',/,
     2      ' *** HOWEVER, THE USER INDICATED A PARTIAL CONCENTRATION',
     3       ' FILE WAS TO BE READ (I.E., IFILE =',I2,').')
 1020 FORMAT('0*** PARTIAL CONCENTRATION FILE IS BEING READ (I.E., ',
     1       'IFLAG = ',I2,').',/,
     2      ' *** HOWEVER, THE USER INDICATED AN HOURLY CONCENTRATION',
     3       ' FILE WAS TO BE READ (I.E., IFILE =',I2,').')
 1030 FORMAT('0*** ID FROM MET FILE USED TO GENERATE CONCENTRATION ',
     1       'FILE IS: ',2A4,3X,I6,3X,I6,/,
     2      ' *** EXPECTED ID IS: ',2A4,3X,I6,3X,I6)
 1040 FORMAT('0*** CONCENTRATION FILE CONTAINS ',A4,' CONCENTRATIONS.'/
     1      ' *** USER IS EXPECTING ',A4,' CONCENTRATIONS.')
 1050 FORMAT('0***,SYSTEM ERROR OCCURRED READING HEADER RECORDS IN ',
     1       'CONCENTRATION FILE.')
 1060 FORMAT('0***,END-OF-FILE OCCURRED READING HEADER RECORDS IN ',
     1       'CONCENTRATION FILE.')
      END
      SUBROUTINE TP230
C        230-PROCESS-CONTROL-INFORMATION
C
C        CALLING ROUTINES:
C          MAIN
C
C        SUBPROGRAMS CALLED:
C          TP310, TP320, TP330
C
C        DESCRIPTION:
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C           THIS MODULE PROCESSES AND ECHOES THE INPUT DATA.  TP230     TPP05610
C           CALLS SUBROUTINES TP310, TP320, AND TP330 TO PRINT GENERAL  TPP05620
C           INFORMATION, FILL IN SIGNIFICANT POINT SOURCE ARRAY, AND    TPP05630
C           PRINT THE RECEPTOR INFORMATION, RESPECTIVELY.               TPP05640
C                                                                       TPP05650
      PARAMETER (NPTMAX=25)                                             TPP05660
      COMMON /RUNCOM/CONTWO,CELM,HAFL,CONTER(4),IYRS,IDYS,IHRS,IHLIM,   TPP05670
     1               IOPT,IOPB,IOPD,IOPG,IOPM,IOPQ,IOPS,IOPR,IOPDHC,    TPP05680
     2               IOPDPC,IOPDHS,IOPDPH,IOPDAC,IOPDAS,IOPDHI,IFILE,   TPP05690
     3               NPER,NAVG,HEAD1(20),HEAD2(20),HEAD3(20),LINE1(20), TPP05700
     4               LINE2(20),LINE3(20),NPOL                           TPP05710
      COMMON /SORCOM/D(NPTMAX),PNAME(3,NPTMAX),PSH(NPTMAX),QJ(NPTMAX),  TPP05720
     1               QELEV(NPTMAX),QEAST(NPTMAX),QNORD(NPTMAX),         TPP05730
     2               SIGP(NPTMAX),TS(NPTMAX),VS(NPTMAX),HSAV(NPTMAX),   TPP05740
     3               DSAV(NPTMAX),NPTLIM,NSIGP,INPT,IMPS(NPTMAX),       TPP05750
     4               IPSIGS(NPTMAX),MPS(NPTMAX)                         TPP05760
      COMMON /INOUT/ IN,IO,ICF                                          TPP05770
C                                                                       TPP05780
C         PRINT GENERAL INFORMATION.                                    TPP05790
C                                                                       TPP05800
      CALL TP310                                                        TPP05810
C                                                                       TPP05820
C         FILL IN SIGNIFICANT POINT SOURCE ARRAY.                       TPP05830
C                                                                       TPP05840
      CALL TP320                                                        TPP05850
C                                                                       TPP05860
C         PRINT POINT SOURCE INFORMATION.                               TPP05870
C                                                                       TPP05880
      WRITE(IO,1000) HEAD1,HEAD2,HEAD3                                  TPP05890
      WRITE(IO,1010) NPOL                                               TPP05900
      DO 100 NPT = 1,NPTLIM                                             TPP05910
         IF (NPT/50*50 .NE. NPT) GO TO 10                               TPP05920
         WRITE(IO,1000) HEAD1,HEAD2,HEAD3                               TPP05930
         WRITE(IO,1010) NPOL                                            TPP05940
   10    WRITE(IO,1020) NPT,(PNAME(J,NPT), J = 1,3),QEAST(NPT),         TPP05950
     1                  QNORD(NPT),QELEV(NPT),QJ(NPT),                  TPP05960
     2                  PSH(NPT),TS(NPT),D(NPT),VS(NPT),IMPS(NPT),      TPP05970
     3                  SIGP(NPT)                                       TPP05980
  100 CONTINUE                                                          TPP05990
C                                                                       TPP06000
C         PRINT RECEPTOR INFORMATION.                                   TPP06010
C                                                                       TPP06020
      CALL TP330                                                        TPP06030
C                                                                       TPP06040
      RETURN                                                            TPP06050
C                                                                       TPP06060
C         FORMAT STATEMENTS.                                            TPP06070
C                                                                       TPP06080
 1000 FORMAT(1H1,'TITLE:  ',20A4,2(/,9X,20A4))                          TPP06090
 1010 FORMAT(1H0,47X,'* * * POINT SOURCE INFORMATION * * *',//,         TPP06100
     1       1X,18X,'---------COORDINATES--------',25X,'--------STACK ', TPP06110
     2          'PARAMETERS---------       RANK OF    USER-SPECIFIED',/, TPP06120
     3       1X,4X,'SOURCE',15X,'(USER UNITS)            ---EMISSIONS ', TPP06130
     4          '(G/SEC)---',5X,'HGT      TEMP      DIA     VEL     ',  TPP06140
     5          'POTENTIAL       SIGNIFICANT',/,                        TPP06150
     6       1X,2X,'#',2X,'NAME',12X,'EAST       NORTH       ELEV',14X, TPP06160
     7          A4,6X,'   (M)       (K)       (M)     (M/S)      IMPACT', TPP06170
     8          9X,'SOURCE?')                                           TPP06180
 1020 FORMAT(1X,I3,1X,3A4,1X,3F9.2,F18.2,6X,4F8.1,3X,I6,12X,A4)         TPP06190
      END                                                               TPP06200
      SUBROUTINE TP310                                                  TPP06210
C        310-PRINT-GENERAL-INFORMATION                                  TPP06220
C                                                                       TPP06230
C        CALLING ROUTINES:                                              TPP06240
C          TP230                                                        TPP06250
C                                                                       TPP06260
C        DESCRIPTION:                                                   TPP06270
C         THIS MODULE PRINTS CONTROL INFORMATION AND CONCENTRATION FILETPP06280
C         HEADER INFORMATION.                                           TPP06290
C                                                                       TPP06300
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      PARAMETER (NDMAX=40,NPTMAX=25,NREMAX=180)                         TPP06310
      COMMON /RUNCOM/CONTWO,CELM,HAFL,CONTER(4),IYRS,IDYS,IHRS,IHLIM,   TPP06320
     1               IOPT,IOPB,IOPD,IOPG,IOPM,IOPQ,IOPS,IOPR,IOPDHC,    TPP06330
     2               IOPDPC,IOPDHS,IOPDPH,IOPDAC,IOPDAS,IOPDHI,IFILE,   TPP06340
     3               NPER,NAVG,HEAD1(20),HEAD2(20),HEAD3(20),LINE1(20), TPP06350
     4               LINE2(20),LINE3(20),NPOL                           TPP06360
      COMMON /METCOM/METNAM(2),MDATA,MDATB,ND,DESC(18,NDMAX)            TPP06370
      COMMON /SORCOM/D(NPTMAX),PNAME(3,NPTMAX),PSH(NPTMAX),QJ(NPTMAX),  TPP06380
     1               QELEV(NPTMAX),QEAST(NPTMAX),QNORD(NPTMAX),         TPP06390
     2               SIGP(NPTMAX),TS(NPTMAX),VS(NPTMAX),HSAV(NPTMAX),   TPP06400
     3               DSAV(NPTMAX),NPTLIM,NSIGP,INPT,IMPS(NPTMAX),       TPP06410
     4               IPSIGS(NPTMAX),MPS(NPTMAX)                         TPP06420
      COMMON /TABCOM/CONC(NREMAX,5),HMAXA(5,NREMAX,5),SUM(NREMAX),      TPP06430
     1               HSAV12(NPTMAX,12),DSAV12(NPTMAX,12),               TPP06440
     2               CONC12(NREMAX,12),NA3,NA8,NA24,NAX,NAV5,NAVT,NP3,  TPP06450
     3               NP8,NP24,NPX,NPER3,NPER8,NPER24,NPERX,NTAH,NVAL3,  TPP06460
     4               NVAL8,NVAL24,NVALX,NSUPL(5,NREMAX,5),NTIME(5),     TPP06470
     5               IYR12(12),IDY12(12),LH12(12)                       TPP06480
      COMMON /INOUT/ IN,IO,ICF                                          TPP06490
C                                                                       TPP06500
C         PRINT TITLE.                                                  TPP06510
C                                                                       TPP06520
      WRITE(IO,1000) HEAD1,HEAD2,HEAD3                                  TPP06530
C                                                                       TPP06540
C         PRINT TITLE OF TUPOS SIMULATION.                              TPP06550
C                                                                       TPP06560
      WRITE(IO,1010) LINE1,LINE2,LINE3                                  TPP06570
C                                                                       TPP06580
C         PRINT MET FILE INFORMATION.                                   TPP06590
C                                                                       TPP06600
      WRITE(IO,1020) METNAM,MDATA,MDATB                                 TPP06610
      WRITE(IO,1030) (DESC(J,1), J = 1,18)                              TPP06620
      IF (ND .EQ. 1) GO TO 10                                           TPP06630
      DO 10 N = 2,ND                                                    TPP06640
         WRITE(IO,1040) (DESC(J,N), J = 1,18)                           TPP06650
   10 CONTINUE                                                          TPP06660
C                                                                       TPP06670
C         PRINT SIMULATION INFORMATION.                                 TPP06680
C                                                                       TPP06690
      WRITE(IO,1050) NPOL,IYRS,IDYS,IHRS,IHLIM,CONTWO,NSIGP             TPP06700
      WRITE(IO,1060) NPER,NAVG                                          TPP06710
      IF (HAFL .EQ. 0.) WRITE(IO,1070)                                  TPP06720
      IF (HAFL .GT. 0.) WRITE(IO,1080) HAFL                             TPP06730
      IF (IOPDHI .EQ. 1) GO TO 40                                       TPP06740
C                                                                       TPP06750
C         PRINT HI-5 INFORMATION.                                       TPP06760
C                                                                       TPP06770
      NAVT = 5                                                          TPP06780
      IF ((NAV5 .EQ. 1) .OR. (NAV5 .EQ. 3) .OR. (NAV5 .EQ. 8) .OR.      TPP06790
     1    (NAV5 .EQ. 24) .OR. (NAV5 .EQ. 0)) NAVT = 4                   TPP06800
      NTIME(5) = NAV5                                                   TPP06810
      WRITE(IO,1090) NAVT                                               TPP06820
      WRITE(IO,1100) NVAL3,NVAL8,NVAL24                                 TPP06830
      IF (NAVT .EQ. 5) WRITE(IO,1110) NAV5,NVALX                        TPP06840
C                                                                       TPP06850
   40 IF (IOPT .EQ. 0) GO TO 50                                         TPP06860
      IF (CELM .EQ. 0.) CELM = 1.                                       TPP06870
      WRITE(IO,1120) CELM                                               TPP06880
C                                                                       TPP06890
C         PRINT OPTION LIST.                                            TPP06900
C                                                                       TPP06910
   50 WRITE(IO,1130)                                                    TPP06920
      WRITE(IO,1140) IOPT,IOPB,IOPD,IOPG,IOPM,IOPQ,IOPS,IOPR            TPP06930
      WRITE(IO,1150) IOPDHC,IOPDPC,IOPDHS,IOPDPH,IOPDAC,IOPDAS,IOPDHI   TPP06940
      IF (IOPT .GT. 0) WRITE(IO,1160) CONTER                            TPP06950
C                                                                       TPP06960
      RETURN                                                            TPP06970
C                                                                       TPP06980
C         FORMAT STATEMENTS.                                            TPP06990
C                                                                       TPP07000
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1000 FORMAT('0TITLE:  ',20A4,2(/,9X,20A4))
1010 FORMAT(1H0,'TITLE OF TUPOS SIMULATION:  ',20A4,2(/,29X,20A4))        TPP07010
1020 FORMAT(1H0,'MET FILE IDENTIFIER:  ',2A4,/,                           TPP07020
   2       1X,'CREATED:  ',I6,' (YR MO DAY)',5X,I6,' (HR MIN SEC)')       TPP07030
1030 FORMAT(1X,'DESCRIPTION:  ',18A4)                                      TPP07040
1040 FORMAT(1X,14X,18A4)                                                   TPP07050
1050 FORMAT(1H0,31X,'* * * GENERAL INPUT INFORMATION * * *',//,           TPP07060
   1       1X,'THIS SIMULATION FOR THE POLLUTANT ',A4,' BEGINS AT',       TPP07070
   2         ' YEAR: 19',I2,'  JULIAN DAY:',I4,'  HOUR:',I3,' AND',       TPP07080
   3         ' IS FOR ',I5,' HOURS.',/,                                    TPP07090
   4       1X,'A FACTOR OF ',1PE12.6,' HAS BEEN SPECIFIED TO CONVERT',    TPP07100
   5         ' USER LENGTH UNITS TO KILOMETERS.',/,                        TPP07110
   6       1X,'FOR THIS SIMULATION ',I3,' SIGNIFICANT SOURCES ARE TO',    TPP07120
   7         ' BE CONSIDERED.')                                             TPP07130
1060 FORMAT(1X,'THIS SIMULATION WILL CONSIDER',2I4,'-HOUR PERIODS.')      TPP07140
1070 FORMAT(1X,'THIS SIMULATION WILL NOT CONSIDER ANY POLLUTANT LOSS.')   TPP07150
1080 FORMAT(1X,'A HALF-LIFE OF ',F10.2,' SECONDS HAS BEEN ASSUMED BY ',   TPP07160
   1         'THE USER.')                                                   TPP07170
1090 FORMAT(1X,'HIGH-FIVE SUMMARY CONCENTRATION TABLES WILL BE ',         TPP07180
   1         'OUTPUT FOR ',I3,' AVERAGING PERIODS.',/,                     TPP07190
   2       1X,'AVERAGING TIMES OF 1,3,8, AND 24 HOURS ARE ',              TPP07200
   3         'AUTOMATICALLY DISPLAYED.')                                    TPP07210
1100 FORMAT(1X,'THE FOLLOWING NUMBER OF HOURS ARE REQUIRED FOR A ',       TPP07220
   1         'VALID PERIOD IN THE HI-5 TABLE:',I2,' FOR 3-HR,',I2,         TPP07230
   2         ' FOR 8-HR, AND ',I2,' FOR 24-HR.')                            TPP07240
1110 FORMAT(1X,'THE ADDITIONAL AVERAGING PERIOD OF',I3,' HRS WILL ',      TPP07250
   1         'ALSO BE DISPLAYED.',/,                                        TPP07260
   2       1X,'THERE MUST BE ',I3,' HRS OF VALID DATA TO CONSIDER ',      TPP07270
   3         'PERIOD VALID FOR HI-5 TABLE.')                                TPP07280
1120 FORMAT(1X,'A FACTOR OF ',1PE12.6,' HAS BEEN SPECIFIED TO ',          TPP07290
   1         'CONVERT USER HEIGHT UNITS TO METERS.')                       TPP07300
1130 FORMAT(1H0,'OPTION SPECIFICATION (1 = EMPLOY OPTION; ',              TPP07310
   1         '0 = DO NOT USE OPTION.)',/,                                   TPP07320
   2       1X,'OPTION',8X,'MEANING',/)                                      TPP07330
1140 FORMAT(13X,'TECHNICAL OPTIONS',/,                                     TPP07340
   1       1X,'IOPT   ',I4,'    USE TERRAIN ADJUSTMENTS.',/,              TPP07350
   2       1X,'IOPB   ',I4,'    USE BUOYANCY-INDUCED DISPERSION.',/,      TPP07360
   3       1X,'IOPD   ',I4,'    NO STACK DOWNWASH.',/,                    TPP07370
   4       1X,'IOPG   ',I4,'    NO GRADUAL PLUME RISE.',/,                TPP07380
   5       1X,'IOPM   ',I4,'    TEST AGAINST MIXING AT NIGHT.',//,        TPP07390
   6      13X,'INPUT OPTIONS',/,                                            TPP07400
   7       1X,'IOPQ   ',I4,'    READ HOURLY EMISSIONS.',/,                TPP07410
   8       1X,'IOPS   ',I4,'    SPECIFY SIGNIFICANT SOURCES.',/,          TPP07420
   9       1X,'IOPR   ',I4,'    INPUT RADIAL DISTANCES AND GENERATE ',    TPP07430
   A         'POLAR COORDINATE RECEPTORS.',/)                               TPP07440
1150 FORMAT(13X,'PRINTED OUTPUT OPTIONS',/,                                TPP07450
   1       1X,'IOPDHC',I4,'    DELETE HOURLY CONTRIBUTIONS.',/,           TPP07460
   2       1X,'IOPDPC',I4,'    DELETE FINAL PLUME HEIGHT AND ',           TPP07470
   3         'DISTANCE TO FINAL RISE ON HOURLY CONTRIBUTIONS.',/,          TPP07480
   4       1X,'IOPDHS',I4,'    DELETE HOURLY SUMMARY.',/,                 TPP07490
   5       1X,'IOPDPH',I4,'    DELETE FINAL PLUME HEIGHT AND ',           TPP07500
   6         'DISTANCE TO FINAL RISE ON HOURLY SUMMARY.',/,                TPP07510
   7       1X,'IOPDAC',I4,'    DELETE AVERAGING-PERIOD ',                 TPP07520
   8         'CONTRIBUTIONS.',/,                                            TPP07530
   9       1X,'IOPDAS',I4,'    DELETE AVERAGING-PERIOD SUMMARY.',/,       TPP07540
   1       1X,'IOPDHI',I4,'    DELETE AVERAGE CONCENTRATIONS AND ',       TPP07550
   2         'HIGH-FIVE TABLE.')                                            TPP07560
1160 FORMAT(1H0,'TERRAIN ADJUSTMENTS ARE: ',4F8.3)                         TPP07570
     END                                                                    TPP07580
     SUBROUTINE TP320                                                       TPP07590
C        320-FILL-IN-SIGNIFICANT-POINT-SOURCE-ARRAY                         TPP07600
C                                                                           TPP07610
C        CALLING ROUTINES:                                                  TPP07620
C          TP230                                                            TPP07630
C                                                                           TPP07640
C        DESCRIPTION:                                                       TPP07650
C          THIS SUBROUTINE FILLS IN THE SIGNIFICANT POINT SOURCE ARRAY.     TPP07660
C          ALSO SIGNIFICANT SOURCES ARE FLAGGED.                            TPP07670
C                                                                           TPP07680
     PARAMETER (NPTMAX=25)                                                  TPP07690
                                                                            TPP07700
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      REAL NA,NO
      COMMON /RUNCOM/CONTWO,CELM,HAFL,CONTER(4),IYRS,IDYS,IHRS,IHLIM,
     1               IOPT,IOPB,IOPD,IOPG,IOPM,IOPQ,IOPS,IOPR,IOPDHC,
     2               IOPDPC,IOPDHS,IOPDPH,IOPDAC,IOPDAS,IOPDHI,IFILE,
     3               NPER,NAVG,HEAD1(20),HEAD2(20),HEAD3(20),LINE1(20),
     4               LINE2(20),LINE3(20),NPOL
      COMMON /SORCOM/D(NPTMAX),PNAME(3,NPTMAX),PSH(NPTMAX),QJ(NPTMAX),
     1               QELEV(NPTMAX),QEAST(NPTMAX),QNORD(NPTMAX),
     2               SIGP(NPTMAX),TS(NPTMAX),VS(NPTMAX),HSAV(NPTMAX),
     3               DSAV(NPTMAX),NPTLIM,NSIGP,INPT,IMPS(NPTMAX),
     4               IPSIGS(NPTMAX),MPS(NPTMAX)
      DATA NA/'N.A.'/, NO/' NO '/, YES/' YES'/
C
      IF (IOPS .EQ. 1) GO TO 50
C
C         SIGNIFICANT POINT SOURCES NOT CONSIDERED (I.E., IOPS = 0).
C
      DO 20 NPT = 1,NPTLIM
         SIGP(NPT) = NA
   20 CONTINUE
      GO TO 999
C
C         IF NFILL > 0, THEN ADD SIGNIFICANT SOURCES DETERMINED FROM
C          RANKED SOURCE LIST.
C
   50 NFILL = NSIGP - INPT
      IF (NFILL .EQ. 0) GO TO 400
      IF (INPT .GT. 0) GO TO 100
C         INPT = 0 AND NFILL > 0
      DO 60 I = 1,NSIGP
         MPS(I) = IMPS(I)
   60 CONTINUE
      GO TO 400
C         INPT > 0 AND NFILL > 0
  100 IFILL = 0
      JSTART = 1
      DO 300 I = 1,NFILL
         DO 250 J = JSTART,NPTLIM
            DO 200 K = 1,INPT
               IF (IMPS(J) .EQ. MPS(K)) GO TO 150
               IF (IFILL .EQ. 0) IFILL = J
               GO TO 200
  150          IFILL = 0
               GO TO 210
  200       CONTINUE
  210       IF (IFILL .EQ. 0) GO TO 250
            MPS(INPT+I) = IMPS(IFILL)
            IFILL = 0
            JSTART = J + 1
            GO TO 300
  250    CONTINUE
  300 CONTINUE
C
C         FILL IN SIGNIFICANT POINT SOURCE ARRAY.
C
  400 DO 410 I = 1,NSIGP
         J = MPS(I)
         IPSIGS(J) = I
  410 CONTINUE
C
C         FLAG SIGNIFICANT POINT SOURCES.
C
      DO 510 NPT = 1,NPTLIM
         SIGP(NPT) = NO
  510 CONTINUE
C
      DO 550 I = 1,NSIGP
         NPT = MPS(I)
         SIGP(NPT) = YES
  550 CONTINUE
```

```
C
  999 RETURN
      END
      SUBROUTINE TP330
C        330-PRINT-RECEPTOR-INFORMATION
C
C        CALLING ROUTINES:
C          TP230
C
C        DESCRIPTION:
C          THIS MODULE PRINTS THE RECEPTOR TABLE WITH APPROPRIATE
C          FOOTNOTES.
C
      PARAMETER (NPTMAX=25,NREMAX=180)
      COMMON /RUNCOM/CONTWO,CELM,HAFL,CONTER(4),IYRS,IDYS,IHRS,IHLIM,
     1               IOPT,IOPB,IOPD,IOPG,IOPM,IOPQ,IOPS,IOPR,IOPDHC,
     2               IOPDPC,IOPDHS,IOPDPH,IOPDAC,IOPDAS,IOPDHI,IFILE,
     3               NPER,NAVG,HEAD1(20),HEAD2(20),HEAD3(20),LINE1(20),
     4               LINE2(20),LINE3(20),NPOL
      COMMON /RECCOM/ELR(NREMAX),PARTC(NREMAX,NPTMAX),PCHI(NREMAX),
     1               PHCHI(NREMAX),PHSIGS(NREMAX,26),PSIGS(NREMAX,26),
     2               RNAME(2,NREMAX),RREC(NREMAX),SREC(NREMAX),
     3               STAR(2,NREMAX),ZR(NREMAX),NRELIM
      COMMON /INOUT/ IN,IO,ICF
      DATA STR/'*'/,BLNK/' '/
C
      IFOOT1 = 0
      IFOOT2 = 0
C
C        PRINT RUN TITLE, PAGE TITLE, AND COLUMN HEADINGS.
C
      WRITE(IO,1000) HEAD1,HEAD2,HEAD3
      WRITE(IO,1010)
      WRITE(IO,1020)
C
C        PRINT RECEPTOR DETAILS.
C
      DO 100 NRE = 1,NRELIM
        IF (NRE/50*50 .NE. NRE) GO TO 10
        WRITE(IO,1000) HEAD1,HEAD2,HEAD3
        WRITE(IO,1010)
        WRITE(IO,1020)
   10   WRITE(IO,1030) NRE,(RNAME(I,NRE), I = 1,2),RREC(NRE),SREC(NRE),
     1                 ELR(NRE),STAR(1,NRE),STAR(2,NRE),ZR(NRE)
        IF ((STAR(1,NRE) .EQ. STR) .AND. (STAR(2,NRE) .EQ. BLNK))
     1                                     IFOOT1 = 1
        IF ((STAR(2,NRE) .EQ. STR) .AND. (STAR(2,NRE) .EQ. STR))
     1                                     IFOOT2 = 1
  100 CONTINUE
C
C        PRINT FOOTNOTES AS REQUIRED.
C
      IF (IFOOT1 .EQ. 1) WRITE(IO,1040)
      IF (IFOOT2 .EQ. 1) WRITE(IO,1050)
      IF (IOPT .EQ. 1) GO TO 150
      WRITE(IO,1060)
      GO TO 999
  150 WRITE(IO,1070)
C
  999 RETURN
C
C        FORMAT STATEMENTS.
C
 1000 FORMAT(1H1,'TITLE:  ',20A4,2(/,9X,20A4))
 1010 FORMAT(1H0,27X,'* * * RECEPTOR INFORMATION * * *')
 1020 FORMAT(1H0,'RECEPTOR    IDENTIFICATION              ------------COORDI',
     1       'NATES------------            HEIGHT ABOVE',/,
     2       1X,45X,'(USER UNITS)',16X,'LOCAL GRD-LVL',/,
     3       1X,38X,'EAST              NORTH             ELEV            (M)')
 1030 FORMAT(1X,I5,10X,2A4,6X,3F13.2,1X,2A1,F10.2)
 1040 FORMAT(1H0,'*  RECEPTOR ELEVATION IS BELOW LOWEST STACK BASE ',      TPP09110
     1          'ELEVATION.')                                              TPP09120
 1050 FORMAT(1H0,'** RECEPTOR ELEVATION IS ABOVE LOWEST STACK TOP ',       TPP09130
     1          'ELEVATION.')                                              TPP09140
 1060 FORMAT('ONOTE:  THE TERRAIN OPTION, IOPT, IS NOT BEING USED FOR',    TPP09150
     1       ' THIS RUN AND',/,                                            TPP09160
     2      8X,'GROUND-LEVEL ELEVATIONS (STACK OR RECEPTOR) GIVEN ON ',    TPP09170
     3        'INPUT ARE IGNORED.')                                        TPP09180
 1070 FORMAT('ONOTE:  THE TERRAIN OPTION, IOPT, IS BEING USED FOR ',       TPP09190
     1       'THIS RUN.',/,                                                TPP09200
     2      8X,'GROUND-LEVEL ELEVATIONS OF RECEPTORS ARE CONSIDERED ',     TPP09210
     3        'RELATIVE TO STACK BASE ELEVATIONS.',/,                      TPP09220
     4      8X,'THE WAY THE EFFECTIVE HEIGHT COMPUTATION IS AFFECTED ',    TPP09230
     5        'IS ALSO DEPENDENT UPON TERRAIN ADJUSTMENT FACTORS.')        TPP09240
      END                                                                  TPP09250
      SUBROUTINE TP240(ICOND)                                              TPP09260
C         240-PERFORM-AVERAGING                                            TPP09270
C                                                                          TPP09280
C           PARAMETER LIST:                                                TPP09290
C             OUTPUT:   ICOND - CONDITION INDICATOR (0 = NO ERROR)         TPP09300
C                                                                          TPP09310
C           CALLING ROUTINES:                                              TPP09320
C             MAIN                                                         TPP09330
C                                                                          TPP09340
C           SUBPROGRAMS CALLED:                                            TPP09350
C             TP340, TP350, TP360, TP370, TP380, TP390, CHRON, ICHRON      TPP09360
C                                                                          TPP09370
C           DESCRIPTION:                                                   TPP09380
C             THIS SUBROUTINE PERFORMS THE USER-SPECIFIED AVERAGING.       TPP09390
C                                                                          TPP09400
      PARAMETER (NPTMAX = 25,NREMAX = 180)                                 TPP09410
      COMMON /RUNCOM/CONTWO,CELM,HAFL,CONTER(4),IYRS,IDYS,IHRS,IHLIM,      TPP09420
     1               IOPT,IOPB,IOPD,IOPG,IOPM,IOPQ,IOPS,IOPR,IOPDHC,      TPP09430
     2               IOPDPC,IOPDHS,IOPDPH,IOPDAC,IOPDAS,IOPDHI,IFILE,     TPP09440
     3               NPER,NAVG,HEAD1(20),HEAD2(20),HEAD3(20),LINE1(20),   TPP09450
     4               LINE2(20),LINE3(20),NPOL                             TPP09460
      COMMON /SORCOM/D(NPTMAX),PNAME(3,NPTMAX),PSH(NPTMAX),QJ(NPTMAX),    TPP09470
     1               QELEV(NPTMAX),QEAST(NPTMAX),QNORD(NPTMAX),           TPP09480
     2               SIGP(NPTMAX),TS(NPTMAX),VS(NPTMAX),HSAV(NPTMAX),     TPP09490
     3               DSAV(NPTMAX),NPTLIM,NSIGP,INPT,IMPS(NPTMAX),         TPP09500
     4               IPSIGS(NPTMAX),MPS(NPTMAX)                           TPP09510
      COMMON /RECCOM/ELR(NREMAX),PARTC(NREMAX,NPTMAX),PCHI(NREMAX),       TPP09520
     1               PHCHI(NREMAX),PHSIGS(NREMAX,26),PSIGS(NREMAX,26),    TPP09530
     2               RNAME(2,NREMAX),RREC(NREMAX),SREC(NREMAX),           TPP09540
     3               STAR(2,NREMAX),ZR(NREMAX),NRELIM                     TPP09550
      COMMON /TABCOM/CONC(NREMAX,5),HMAXA(5,NREMAX,5),SUM(NREMAX),        TPP09560
     1               HSAV12(NPTMAX,12),DSAV12(NPTMAX,12),                 TPP09570
     2               CONC12(NREMAX,12),NA3,NA8,NA24,NAX,NAV5,NAVT,NP3,    TPP09580
     3               NP8,NP24,NPX,NPER3,NPER8,NPER24,NPERX,NTAH,NVAL3,    TPP09590
     4               NVAL8,NVAL24,NVALX,NSUPL(5,NREMAX,5),NTIME(5),       TPP09600
     5               IYR12(12),IDY12(12),LH12(12)                         TPP09610
      COMMON /INOUT/ IN,IO,ICF                                            TPP09620
C                                                                          TPP09630
C           INITIALIZE PRIOR TO START OF SUMMARY PERIOD.                   TPP09640
C                                                                          TPP09650
   10 CALL CHRON(IYRS,IDYS,IHRS,IHRBEG)                                    TPP09660
      IF (IHRBEG .GT. 0) GO TO 15                                          TPP09670
      ICOND = 24001                                                        TPP09680
      GO TO 999                                                            TPP09690
   15 IHREX = IHRBEG - 1                                                   TPP09700
      IHREND = IHRBEG + IHLIM - 1                                          TPP09710
      IH12 = 0                                                             TPP09720
      IENDSP = 0                                                           TPP09730
      ICFYDH = -1                                                          TPP09740
      NA3 = 0                                                              TPP09750
      NA8 = 0                                                              TPP09760
      NA24 = 0                                                             TPP09770
      NAX = 0                                                              TPP09780
      NP3 = 0                                                              TPP09790
      NP8 = 0                                                              TPP09800
      NP24 = 0
      NPX = 0
      NPER3 = 0
      NPER8 = 0
      NPER24 = 0
      NPERX = 0
C
      DO 40 I = 1,NRELIM
         SUM(I) = 0.0
         DO 30 J = 1,5
            CONC(I,J) = 0.0
            DO 20 K = 1,5
               HMAXA(J,I,K) = 0.0
               NSUPL(J,I,K) = 0
   20       CONTINUE
   30    CONTINUE
   40 CONTINUE
C
      NTAH = 0
C         NTAH:   TOTAL NUMBER OF HOURS CALCULATED
      NHR = 0
C         NHR:    TOTAL NUMBER OF HOURS CONSIDERED
C
C         INITIALIZE FOR NEW AVERAGING PERIOD.
C
   50 KTAVG = 0
C         KTAVG:   COUNT OF NUMBER OF HOURS CONSIDERED FOR AVERAGING
C                  PERIOD
      KAAVG = 0
C         KAAVG:   COUNT OF ACTUAL (NON-MISSING) HOURS INCLUDED IN THE
C                  AVERAGING PERIOD.
      IENDAP = 0
      DO 70 NRE = 1,NRELIM
         PCHI(NRE) = 0.0
         DO 60 I = 1,26
            PSIGS(NRE,I) = 0.0
   60    CONTINUE
   70 CONTINUE
C
C         INITIALIZE FOR NEXT HOUR.
C
  100 IHREX = IHREX + 1
      IH12 = IH12 + 1
      CALL ICHRON(IHREX,IYR,IDY,LH)
      IF((IYR .GE. 0) .AND. (IDY .GE. 0) .AND. (LH .GE. 0)) GO TO 115
      ICOND = 24002
      GO TO 999
  115 IF (IH12 .LE. 12) GO TO 120
      IH12 = 1
  120 IYR12(IH12) = IYR
      IDY12(IH12) = IDY
      LH12(IH12)  = LH
      IF (ICFYDH - IHREX) 150,300,400
C
C         GET CONCENTRATION DATA.
C
  150 MISG = 0
      CALL TP340(IHREX,ICFYDH,ICOND,MISG)
      IF (ICOND .NE. 0) GO TO 999
      MIST = MISG
      IF (ICFYDH - IHREX) 200,300,400
C
C         ERROR READING CONCENTRATION FILE.
C
  200 WRITE(IO,1000) ICF
      ICOND = 24003
      GO TO 999
C
C         HAVE FOUND HOUR OF INTEREST.  ACCUMULATE AVERAGING PERIOD
C          SUMS, INCREMENT COUNTERS, AND FILL APPROPRIATE ARRAYS.
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C
  300 MISG = MIST
      IF (MISG .NE. 0) GO TO 400
      CALL TP350
C
      NTAH = NTAH + 1
      KAAVG = KAAVG + 1
C
      IF (IOPDHS .EQ. 1) GO TO 500
      DO 320 NPT = 1,NPTLIM
         HSAV12(NPT,IH12) = HSAV(NPT)
         DSAV12(NPT,IH12) = DSAV(NPT)
  320 CONTINUE
      DO 340 NRE = 1,NRELIM
         CONC12(NRE,IH12) = PHCHI(NRE)
  340 CONTINUE
      GO TO 500
C
C          MISSING HOUR PROCESSING.
C
  400 MISG = 1
      IF (IOPDHS .EQ. 1) GO TO 500
      DO 420 NPT = 1,NPTLIM
         HSAV12(NPT,IH12) = -9999.9
         DSAV12(NPT,IH12) = -99.999
  420 CONTINUE
      DO 440 NRE = 1,NRELIM
         CONC12(NRE,IH12) = -9999.9E-6
  440 CONTINUE
C
C          INCREMENT APPROPRIATE COUNTERS, PRINT HOURLY RESULTS, AND
C           UPDATE HI-5 TABLE.
C
  500 NHR = NHR + 1
      KTAVG = KTAVG + 1
C
      IF ((MISG .GT. 0) .AND. (IOPDHS .EQ. 1)) GO TO 510
      IENDP = 0
      CALL TP360(IYR,IDY,LH,IH12,IENDP)
      GO TO 520
  510 WRITE(IO,1010) IYR,IDY,LH
C
  520 IF (IOPDHI .EQ. 0) CALL TP370(MISG,IYR,IDY,LH)
C
C          IF AT END OF AVERAGING PERIOD, THEN PRINT PORTION OF HOURLY
C           RESULTS AND PRINT AVERAGED RESULTS.
C
      IF (KTAVG .NE. NAVG) GO TO 550
      IENDAP = 1
      IF ((IOPDHS .EQ. 0) .AND. (IENDP .EQ. 0))
     1                        CALL TP360(IYR,IDY,LH,IH12,IENDAP)
      IF (KAAVG .EQ. 0) GO TO 530
      CALL TP380(KAAVG,IYR,IDY,LH)
      GO TO 550
  530 IF ((IOPDAC .EQ. 0) .OR. (IOPDAS .EQ. 0))
     1                          WRITE(IO,1020) NAVG,IYR,IDY,LH
C
C          CHECK FOR END OF SUMMARY PERIOD.
C
  550 IF (IHREX .EQ. IHREND) GO TO 600
      IF (KTAVG .EQ. NAVG) GO TO 50
      GO TO 100
C
C          END OF SUMMARY.  PRINT PORTION OF HOURLY RESULTS, PRINT HI-5
C           TABLES, AND GET NEXT SUMMARY PERIOD.
C
  600 IENDSP = 1
      IF ((IOPDHS .EQ. 0) .AND. (IENDAP .EQ. 0) .AND. (IENDP .EQ. 0))
     1                        CALL TP360(IYR,IDY,LH,IH12,IENDSP)
      IF (IOPDHI .EQ. 0) CALL TP390(NHR,IYR,IDY,LH)
      READ(IN,*,ERR=650,END=999) IYRS,IDYS,IHRS,IHLIM
      GO TO 10
C         ERROR ON READING NEW SUMMARY PERIOD.
  650 ICOND = 24004
      WRITE(IO,1030)
C
  999 RETURN
C
C         FORMAT STATEMENTS.
C
 1000 FORMAT('0*** ERROR READING CONCENTRATION FILE (UNIT ',I2,').')
 1010 FORMAT('0CONCENTRATIONS FOR YEAR-DAY-HOUR, ',I2,'-',I3,'-',I2,
     1       ', ARE MISSING.')
 1020 FORMAT('0NO VALID DATA TO CALCULATE ',I5,'-HR CONCENTRATION FOR ',
     1       'YEAR-DAY-HOUR ',I2,'-',I3,'-',I2,'.')
 1030 FORMAT('0*** SYSTEM ERROR ON READING INPUT FOR NEXT SUMMARY ',
     1       'PERIOD.')
      END
      SUBROUTINE TP340(IHREX,ICFYDH,ICOND,MISG)
C         340-GET-CONCENTRATION-DATA
C
C         ARGUMENT LIST:
C           INPUT:   IHREX  - SIMULATED HOUR
C           OUTPUT:  ICFYDH - HOUR READ FROM CONCENTRATION FILE
C                    ICOND  - CONDITION INDICATOR (0 = NO ERROR)
C                    MISG   - MISSING CODE (1 = MISSING)
C
C         CALLING ROUTINES:
C           TP240
C
C         SUBPROGRAMS CALLED:
C           TP410, CHRON
C
C         DESCRIPTION:
C           THIS MODULE CALLS TP410 TO DO THE ACTUAL I/O TO THE CONCEN-
C           TRATION FILE.  THE CONCENTRATION FILE IS READ UNTIL THE
C           SIMULATED HOUR (IHREX) IS FOUND.  CONCENTRATION DATA IS
C           PASSED THROUGH COMMON RECCOM BETWEEN TP340 AND TP410.
C
       PARAMETER (NPTMAX=25,NREMAX=180)
       COMMON /RUNCOM/CONTWO,CELM,HAFL,CONTER(4),IYRS,IDYS,IHRS,IHLIM,
     1                IOPT,IOPB,IOPD,IOPG,IOPM,IOPQ,IOPS,IOPR,IOPDHC,
     2                IOPDPC,IOPDHS,IOPDPH,IOPDAC,IOPDAS,IOPDHI,IFILE,
     3                NPER,NAVG,HEAD1(20),HEAD2(20),HEAD3(20),LINE1(20),
     4                LINE2(20),LINE3(20),NPOL
       COMMON /RECCOM/ELR(NREMAX),PARTC(NREMAX,NPTMAX),PCHI(NREMAX),
     1                PHCHI(NREMAX),PHSIGS(NREMAX,26),PSIGS(NREMAX,26),
     2                RNAME(2,NREMAX),RREC(NREMAX),SREC(NREMAX),
     3                STAR(2,NREMAX),ZR(NREMAX),NRELIM
       COMMON /INOUT/ IN,IO,ICF
       DATA AMISG/-9999./
C
       MISG = 0
C
C          READ HOURLY CONCENTRATION FILE.
C
    10 CALL TP410(ICFYR,ICFJD,ICFHR,ICOND,IEOF)
       IF (ICOND .EQ. 0) GO TO 100
       WRITE(IO,1000)
       GO TO 999
C
C          NO ERROR ON READ.  CHECK FOR END OF FILE.
C
   100 IF (IEOF .EQ. 0) GO TO 200
       WRITE(IO,1010)
       ICOND = 34001
       GO TO 999
C
C          HOURLY RECORD READ SUCCESSFULLY.  IS IT HOUR OF INTEREST?
C
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  200 CALL CHRON(ICFYR,ICFJD,ICFHR,ICFYDH)
      IF (ICFYDH .GT. 0) GO TO 210
      ICOND = 34002
      GO TO 999
  210 IF (ICFYDH .LT. IHREX) GO TO 10
C
C         CHECK TO SEE IF CONCENTRATIONS ARE MISSING.
C
      IF (IFILE .EQ. 0) GO TO 320
      IF (PARTC(1,1) .EQ. AMISG) MISG = 1
      GO TO 999
  320 IF (PHCHI(1) .EQ. AMISG) MISG = 1
C
  999 RETURN
C
C         FORMAT STATEMENTS.
C
 1000 FORMAT('0***,SYSTEM ERROR OCCURRED WHEN READING HOURLY ',
     1       'CONCENTRATION RECORD.')
 1010 FORMAT('0***,THE CONCENTRATION FILE WAS EXHAUSTED WITHOUT ',
     1       'FINDING DATA FOR THE HOUR REQUESTED.')
      END
      SUBROUTINE TP410(ICFYR,ICFJD,ICFHR,ICOND,IEOF)
C        410-READ-CONCENTRATION-FILE
C
C          ARGUMENT LIST:
C            OUTPUT:   ICFYR - 2-DIGIT YEAR
C                      ICFJD - JULIAN DAY
C                      ICFHR - HOUR
C                      ICOND - CONDITION INDICATOR (0 = NO ERROR)
C                      IEOF  - END OF FILE INDICATOR (1 = END OF FILE)
C
C          CALLING ROUTINES:
C            TP340
C
C          DESCRIPTION:
C            THIS MODULE READS THE HOURLY CONCENTRATION RECORDS OF BOTH
C            HOURLY AND PARTIAL CONCENTRATION FILES.  CONCENTRATION DATA
C            IS READ INTO COMMON RECCOM.  ERRORS ARE INDICATED BY PASSING
C            A NON-ZERO VALUE THROUGH ICOND.  END OF FILE IS INDICATED BY
C            PASSING A VALUE OF ONE THROUGH IEOF.
C
C***  INPUT FILE (UNIT 9) HOURLY CONCENTRATION FILE -- HOURLY RECORDS
C
C          RECORDS 9, 10, AND 11 ARE REPEATED IN SEQUENCE
C            FOR EACH HOUR.
C
C      RECORD TYPE 9 (ONE FOR EACH HOUR)
C          ICFYR           2-DIGIT YEAR
C          ICFJD           JULIAN DAY
C          ICFHR           HOUR
C
C      RECORD TYPE 10 (ONE FOR EACH HOUR)
C          HSAV            EFFECTIVE PLUME HEIGHTS FOR EACH SOURCE
C          DSAV            DISTANCE TO FINAL RISE FOR EACH SOURCE
C
C      RECORD TYPE 11 (ONE FOR EACH HOUR)
C          PHCHI(NRE)      CONCENTRATIONS (G/M**3) AT EACH RECEPTOR
C
C***  INPUT FILE (UNIT 9) PARTIAL CONCENTRATION FILE -- HOURLY RECORDS
C
C          ONE RECORD 9 AND NPTLIM RECORD 10'S ARE
C            WRITTEN EACH HOUR.
C
C      RECORD TYPE 9 (ONE FOR EACH HOUR)
C          IYR             2-DIGIT YEAR
C          IDY             JULIAN DAY
C          LH              HOUR
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C
C     RECORD TYPE 10 (ONE FOR EACH SOURCE, FOR EACH HOUR)
C        HSAV        EFFECTIVE PLUME HEIGHT
C        DSAV        DISTANCE TO FINAL RISE
C        PARTC(NRE)  CONCENTRATIONS (G/M**3) AT EACH RECEPTOR FROM
C                     SOURCE NPT (NRE = 1, NRELIM).
C
      PARAMETER (NPTMAX=25,NREMAX=180)
      COMMON /RUNCOM/CONTWO,CELM,HAFL,CONTER(4),IYRS,IDYS,IHRS,IHLIM,
     1               IOPT,IOPB,IOPD,IOPG,IOPM,IOPQ,IOPS,IOPR,IOPDHC,
     2               IOPDPC,IOPDHS,IOPDPH,IOPDAC,IOPDAS,IOPDHI,IFILE,
     3               NPER,NAVG,HEAD1(20),HEAD2(20),HEAD3(20),LINE1(20),
     4               LINE2(20),LINE3(20),NPOL
      COMMON /SORCOM/D(NPTMAX),PNAME(3,NPTMAX),PSH(NPTMAX),QJ(NPTMAX),
     1               QELEV(NPTMAX),QEAST(NPTMAX),QNORD(NPTMAX),
     2               SIGP(NPTMAX),TS(NPTMAX),VS(NPTMAX),HSAV(NPTMAX),
     3               DSAV(NPTMAX),NPTLIM,NSIGP,INPT,IMPS(NPTMAX),
     4               IPSIGS(NPTMAX),MPS(NPTMAX)
      COMMON /RECCOM/ELR(NREMAX),PARTC(NREMAX,NPTMAX),PCHI(NREMAX),
     1               PHCHI(NREMAX),PHSIGS(NREMAX,26),PSIGS(NREMAX,26),
     2               RNAME(2,NREMAX),RREC(NREMAX),SREC(NREMAX),
     3               STAR(2,NREMAX),ZR(NREMAX),NRELIM
      COMMON /INOUT/ IN,IO,ICF
C
      IEOF = 0
C
C         DETERMINE WHICH KIND OF CONCENTRATION FILE THIS IS.
C
      IF (IFILE .EQ. 0) GO TO 100
C
C         READ HOURLY PARTIAL CONCENTRATION RECORDS.
C
      READ(ICF,ERR=900,END=950) ICFYR,ICFJD,ICFHR
      DO 10 NPT = 1,NPTLIM
         READ(ICF,ERR=900,END=950) HSAV(NPT),DSAV(NPT),(PARTC(NRE,NPT),
     1                             NRE = 1,NRELIM)
   10 CONTINUE
      GO TO 999
C
C         READ HOURLY CONCENTRATION RECORDS.
C
  100 READ(ICF,ERR=900,END=950) ICFYR,ICFJD,ICFHR
      READ (ICF,ERR=900,END=950) (HSAV(NPT), NPT = 1,NPTLIM),
     1 (DSAV(NPT), NPT = 1,NPTLIM)
      READ(ICF,ERR=900,END=950) (PHCHI(NRE), NRE = 1,NRELIM)
      GO TO 999
C
C         ERROR PROCESSING.
C
  900 ICOND = 41001
      GO TO 999
  950 IEOF = 1
C
  999 RETURN
      END
      SUBROUTINE TP350
C        350-ACCUMULATE-AVERAGING-PERIOD-SUMS
C
C        CALLING ROUTINES:
C           TP240
C
C        DESCRIPTION:
C           THIS SUBROUTINE ADDS HOURLY CONCENTRATIONS OR HOURLY PARTIAL
C           CONCENTRATIONS TO VARIOUS SUMS.
C
C        DEFINITIONS OF IMPORTANT VARIABLES:
C
C           PARTC  - HOURLY PARTIAL CONCENTRATION ARRAY.  CONCENTRATIONS
C                    (G/M**3) BY RECEPTOR AND SOURCE.
C           PHCHI  - HOURLY CONCENTRATION ARRAY.  TOTAL HOURLY CONCENTRA-
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C                   TIONS (G/M**3) BY RECEPTOR.                         TPP13310
C         PCHI    - AVERAGING PERIOD CONCENTRATION ARRAY.  SUM OF HOURLYTPP13320
C                   CONCENTRATIONS (G/M**3) OVER NAVG HOURS AT A        TPP13330
C                   SPECIFIC RECEPTOR.                                  TPP13340
C         PHSIGS  - HOURLY PARTIAL CONCENTRATION ARRAY FOR SIGNIFICANT  TPP13350
C                   SOURCES.  THE 26TH ENTRY OF THE 2ND DIMENSION IS THETPP13360
C                   TOTAL HOURLY SIGNIFICANT SOURCE CONTRIBUTION.       TPP13370
C         PSIGS   - AVERAGING PERIOD PARTIAL CONCENTRATION ARRAY FOR    TPP13380
C                   SIGNIFICANT SOURCES.  THE 26TH ENTRY OF THE 2ND     TPP13390
C                   DIMENSION IS THE TOTAL SIGNIFICANT SOURCE CONTRIBU- TPP13400
C                   TION FOR THE AVERAGING PERIOD.                      TPP13410
      PARAMETER (NPTMAX=25,NREMAX=180)                                  TPP13420
      COMMON /RUNCOM/CONTWO,CEIM,HAFL,CONTER(4),IYRS,IDYS,IHRS,IHLIM,   TPP13430
     1               IOPT,IOPB,IOPD,IOPG,IOPM,IOPQ,IOPS,IOPR,IOPDHC,    TPP13440
     2               IOPDPC,IOPDHS,IOPDPH,IOPDAC,IOPDAS,IOPDHI,IFILE,   TPP13450
     3               NPER,NAVG,HEAD1(20),HEAD2(20),HEAD3(20),LINE1(20), TPP13460
     4               LINE2(20),LINE3(20),NPOL                           TPP13470
      COMMON /SORCOM/D(NPTMAX),PNAME(3,NPTMAX),PSH(NPTMAX),QJ(NPTMAX),  TPP13480
     1               QELEV(NPTMAX),QEAST(NPTMAX),QNORD(NPTMAX),         TPP13490
     2               SIGP(NPTMAX),TS(NPTMAX),VS(NPTMAX),HSAV(NPTMAX),   TPP13500
     3               DSAV(NPTMAX),NPTLIM,NSIGP,INPT,IMPS(NPTMAX),       TPP13510
     4               IPSIGS(NPTMAX),MPS(NPTMAX)                         TPP13520
      COMMON /RECCOM/ELR(NREMAX),PARTC(NREMAX,NPTMAX),PCHI(NREMAX),     TPP13530
     1               PHCHI(NREMAX),PHSIGS(NREMAX,26),PSIGS(NREMAX,26),  TPP13540
     2               RNAME(2,NREMAX),RREC(NREMAX),SREC(NREMAX),         TPP13550
     3               STAR(2,NREMAX),ZR(NREMAX),NRELIM                   TPP13560
C                                                                       TPP13570
      IF (IFILE .EQ. 1) GO TO 100                                       TPP13580
C                                                                       TPP13590
C         ACCUMULATIONS IF IFILE = 0 (I.E., HOURLY CONCENTRATION FILE). TPP13600
C                                                                       TPP13610
      DO 10 NRE = 1,NRELIM                                              TPP13620
         PCHI(NRE) = PCHI(NRE) + PHCHI(NRE)                             TPP13630
   10 CONTINUE                                                          TPP13640
      GO TO 999                                                         TPP13650
C                                                                       TPP13660
C         ACCUMULATIONS IF IFILE = 1 (I.E., PARTIAL CONCENTRATION FILE).TPP13670
C                                                                       TPP13680
  100 DO 120 NRE = 1,NRELIM                                             TPP13690
         PHCHI(NRE) = 0.0                                               TPP13700
         DO 110 I = 1,26                                                TPP13710
            PHSIGS(NRE,I) = 0.0                                         TPP13720
  110    CONTINUE                                                       TPP13730
  120 CONTINUE                                                          TPP13740
      DO 300 NPT = 1,NPTLIM                                             TPP13750
      KSIG = IPSIGS(NPT)                                                TPP13760
         DO 200 NRE = 1,NRELIM                                          TPP13770
            PCHI(NRE)  = PCHI(NRE)  + PARTC(NRE,NPT)                    TPP13780
            PHCHI(NRE) = PHCHI(NRE) + PARTC(NRE,NPT)                    TPP13790
C                                                                       TPP13800
            IF (KSIG .EQ. 0) GO TO 200                                  TPP13810
C                                                                       TPP13820
            PSIGS(NRE,KSIG)  = PSIGS(NRE,KSIG)  + PARTC(NRE,NPT)        TPP13830
            PHSIGS(NRE,KSIG) = PHSIGS(NRE,KSIG) + PARTC(NRE,NPT)        TPP13840
            PSIGS(NRE,26)    = PSIGS(NRE,26)    + PARTC(NRE,NPT)        TPP13850
            PHSIGS(NRE,26)   = PHSIGS(NRE,26)   + PARTC(NRE,NPT)        TPP13860
  200    CONTINUE                                                       TPP13870
  300 CONTINUE                                                          TPP13880
C                                                                       TPP13890
  999 RETURN                                                            TPP13900
      END                                                               TPP13910
      SUBROUTINE TP360(IYR,IDY,LH,IH12,IENDP)                           TPP13920
C        360-OUTPUT-HOURLY-RESULTS                                      TPP13930
C                                                                       TPP13940
C        ARGUMENT LIST:                                                 TPP13950
C          INPUT:  IPTITL - POLLUTANT NAME                              TPP13960
C                  IYR    - YEAR TO SIMULATE                            TPP13970
C                  IDY    - JULIAN DAY TO SIMULATE                      TPP13980
C                  LH     - HOUR TO SIMULATE                            TPP13990
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C                  IH12   - COUNTER FOR 12-HR TOTAL CONCENTRATION TABLE TPP14010
C          I/O:    IENDP  - INDICATOR FOR END OF 12-HR, AVERAGING, OR   TPP14020
C                            SUMMARY PERIODS (0 = NOT ENDED, 1 = END OF TPP14030
C                            PERIOD)                                    TPP14040
C                                                                       TPP14050
C        CALLING ROUTINES:                                              TPP14060
C          TP240                                                        TPP14070
C                                                                       TPP14080
C        DESCRIPTION:                                                   TPP14090
C          THIS SUBROUTINE OUTPUTS CONCENTRATIONS IN MICROGRAMS PER     TPP14100
C          CUBIC METER FOR EACH HOUR IN TWO WAYS:                       TPP14110
C              1) CONTRIBUTIONS FROM SIGNIFICANT SOURCES, AND           TPP14120
C              2) SUMMARIES (TABLE OF 12 HOURS).                        TPP14130
C                                                                       TPP14140
C          NOTE THAT CONCENTRATIONS ARE OUTPUT IN MICROGRAMS/M**3 BY    TPP14150
C          USING A "6P" SCALE FACTOR IN FORMAT STATEMENTS 1060, 1070,   TPP14160
C          AND 1150.                                                    TPP14170
C                                                                       TPP14180
      PARAMETER (NPTMAX=25,NREMAX=180)                                  TPP14190
      COMMON /RUNCOM/CONTWO,CELM,HAFL,CONTER(4),IYRS,IDYS,IHRS,IHLIM,   TPP14200
     1               IOPT,IOPB,IOPD,IOPG,IOPM,IOPQ,IOPS,IOPR,IOPDHC,    TPP14210
     2               IOPDPC,IOPDHS,IOPDPH,IOPDAC,IOPDAS,IOPDHI,IFILE,   TPP14220
     3               NPER,NAVG,HEAD1(20),HEAD2(20),HEAD3(20),LINE1(20), TPP14230
     4               LINE2(20),LINE3(20),NPOL                           TPP14240
      COMMON /SORCOM/D(NPTMAX),PNAME(3,NPTMAX),PSH(NPTMAX),QJ(NPTMAX), TPP14250
     1               QELEV(NPTMAX),QEAST(NPTMAX),QNORD(NPTMAX),         TPP14260
     2               SIGP(NPTMAX),TS(NPTMAX),VS(NPTMAX),HSAV(NPTMAX),   TPP14270
     3               DSAV(NPTMAX),NPTLIM,NSIGP,INPT,IMPS(NPTMAX),       TPP14280
     4               IPSIGS(NPTMAX),MPS(NPTMAX)                         TPP14290
      COMMON /RECCOM/ELR(NREMAX),PARTC(NREMAX,NPTMAX),PCHI(NREMAX),     TPP14300
     1               PHCHI(NREMAX),PHSIGS(NREMAX,26),PSIGS(NREMAX,26),  TPP14310
     2               RNAME(2,NREMAX),RREC(NREMAX),SREC(NREMAX),         TPP14320
     3               STAR(2,NREMAX),ZR(NREMAX),NRELIM                   TPP14330
      COMMON /TABCOM/CONC(NREMAX,5),HMAXA(5,NREMAX,5),SUM(NREMAX),      TPP14340
     1               HSAV12(NPTMAX,12),DSAV12(NPTMAX,12),               TPP14350
     2               CONC12(NREMAX,12),NA3,NA8,NA24,NAX,NAV5,NAVT,NP3,  TPP14360
     3               NP8,NP24,NPX,NPER3,NPER8,NPER24,NPERX,NTAH,NVAL3,  TPP14370
     4               NVAL8,NVAL24,NVALX,NSUPL(5,NREMAX,5),NTIME(5),     TPP14380
     5               IYR12(12),IDY12(12),LH12(12)                       TPP14390
      COMMON /INOUT/ IN,IO,ICF                                          TPP14400
C                                                                       TPP14410
      IF (IOPDHC .EQ. 1) GO TO 200                                      TPP14420
C                                                                       TPP14430
C* * * * * * * * * * PRINT HOURLY CONTRIBUTIONS * * * * * * * * * *     TPP14440
C                                                                       TPP14450
C         PRINT TITLE.                                                  TPP14460
C                                                                       TPP14470
      LINE = 0                                                          TPP14480
      WRITE(IO,1000) HEAD1,HEAD2,HEAD3                                  TPP14490
      LINE = LINE + 4                                                   TPP14500
C                                                                       TPP14510
C         PRINT FINAL PLUME HEIGHT AND DISTANCE TO FINAL RISE.          TPP14520
C                                                                       TPP14530
      IF (IOPDPC .EQ. 1) GO TO 20                                       TPP14540
      WRITE(IO,1010) (I, I = 1,10)                                      TPP14550
      WRITE(IO,1020) (HSAV(NPT), NPT = 1,NPTLIM)                        TPP14560
      WRITE(IO,1030) (DSAV(NPT), NPT = 1,NPTLIM)                        TPP14570
      LINE = LINE + 2 + NPTLIM/5                                        TPP14580
C                                                                       TPP14590
C         PRINT HOURLY SIGNIGICANT SOURCE CONTRIBUTIONS.                TPP14600
C                                                                       TPP14610
  20  IF (NSIGP .GT. 10) GO TO 40                                       TPP14620
C         PRINT FIRST PAGE OF OUTPUT AND TOTALS FOR 10 OR LESS          TPP14630
C          SIGNIFICANT SOURCES.                                         TPP14640
      IF (LINE .LT. 50) GO TO 25                                        TPP14650
      LINE = 0                                                          TPP14660
      WRITE(IO,1000) HEAD1,HEAD2,HEAD3                                  TPP14670
      LINE = LINE + 4                                                   TPP14680
  25  WRITE(IO,1040) NPOL,IYR,IDY,LH                                    TPP14690
      WRITE(IO,1050) (MPS(I), I = 1,NSIGP)                              TPP14700
      LINE = LINE + 6                                                   TPP14710
      DO 35 NRE = 1,NRELIM                                              TPP14720
         IF (LINE .LT. 60) GO TO 30                                     TPP14730
         LINE = 0                                                       TPP14740
         WRITE(IO,1000) HEAD1,HEAD2,HEAD3                               TPP14750
         WRITE(IO,1040) NPOL,IYR,IDY,LH                                 TPP14760
         WRITE(IO,1050) (MPS(I), I = 1,NSIGP)                           TPP14770
         LINE = LINE + 10                                               TPP14780
   30    WRITE(IO,1060) NRE,STAR(1,NRE),STAR(2,NRE),(RNAME(J,NRE),      TPP14790
     1                  J = 1,2),(PHSIGS(NRE,I), I = 1,NSIGP)           TPP14800
         WRITE(IO,1070) PHSIGS(NRE,26),PHCHI(NRE)                       TPP14810
         LINE = LINE + 1                                                TPP14820
   35 CONTINUE                                                          TPP14830
      GO TO 200                                                         TPP14840
C        PRINT FIRST PAGE FOR MORE THAN 10 SIGNIFICANT SOURCES.         TPP14850
   40 IF (LINE .LT. 50) GO TO 45                                        TPP14860
      LINE = 0                                                          TPP14870
      WRITE(IO,1000) HEAD1,HEAD2,HEAD3                                  TPP14880
      LINE = LINE + 4                                                   TPP14890
   45 WRITE(IO,1040) NPOL,IYR,IDY,LH                                    TPP14900
      WRITE(IO,1080) (MPS(I), I = 1,10)                                 TPP14910
      LINE = LINE + 6                                                   TPP14920
      DO 55 NRE = 1,NRELIM                                              TPP14930
         IF (LINE .LT. 60) GO TO 50                                     TPP14940
         LINE = 0                                                       TPP14950
         WRITE(IO,1000) HEAD1,HEAD2,HEAD3                               TPP14960
         WRITE(IO,1040) NPOL,IYR,IDY,LH                                 TPP14970
         WRITE(IO,1080) (MPS(I), I = 1,10)                              TPP14980
         LINE = LINE + 10                                               TPP14990
   50    WRITE(IO,1060) NRE,STAR(1,NRE),STAR(2,NRE),(RNAME(J,NRE),      TPP15000
     1                  J = 1,2),(PHSIGS(NRE,I), I = 1,10)              TPP15010
         LINE = LINE + 1                                                TPP15020
   55 CONTINUE                                                          TPP15030
      IF (NSIGP .GT. 20) GO TO 70                                       TPP15040
C        PRINT SECOND PAGE AND TOTALS FOR 11 TO 20 SIGNIFICANT SOURCES. TPP15050
      WRITE(IO,1000) HEAD1,HEAD2,HEAD3                                  TPP15060
      WRITE(IO,1040) NPOL,IYR,IDY,LH                                    TPP15070
      WRITE(IO,1050) (MPS(I), I = 11,NSIGP)                             TPP15080
      DO 65 NRE = 1,NRELIM                                              TPP15090
         IF (NRE/50*50 .NE. NRE) GO TO 60                               TPP15100
         WRITE(IO,1000) HEAD1,HEAD2,HEAD3                               TPP15110
         WRITE(IO,1040) NPOL,IYR,IDY,LH                                 TPP15120
         WRITE(IO,1080) (MPS(I), I = 11,NSIGP)                          TPP15130
   60    WRITE(IO,1060) NRE,STAR(1,NRE),STAR(2,NRE),(RNAME(J,NRE),      TPP15140
     1                  J = 1,2),(PHSIGS(NRE,I), I = 11,NSIGP)          TPP15150
         WRITE(IO,1070) PHSIGS(NRE,26),PHCHI(NRE)                       TPP15160
   65 CONTINUE                                                          TPP15170
      GO TO 200                                                         TPP15180
C        PRINT SECOND PAGE FOR MORE THAN 20 SIGNIFICANT SOURCES.        TPP15190
   70 WRITE(IO,1000) HEAD1,HEAD2,HEAD3                                  TPP15200
      WRITE(IO,1040) NPOL,IYR,IDY,LH                                    TPP15210
      WRITE(IO,1080) (MPS(I), I = 11,20)                                TPP15220
      DO 80 NRE = 1,NRELIM                                              TPP15230
         IF (NRE/50*50 .NE. NRE) GO TO 75                               TPP15240
         WRITE(IO,1000) HEAD1,HEAD2,HEAD3                               TPP15250
         WRITE(IO,1040) NPOL,IYR,IDY,LH                                 TPP15260
         WRITE(IO,1080) (MPS(I), I = 11,20)                             TPP15270
   75    WRITE(IO,1060) NRE,STAR(1,NRE),STAR(2,NRE),(RNAME(J,NRE),      TPP15280
     1                  J = 1,2),(PHSIGS(NRE,I), I = 11,20)             TPP15290
   80 CONTINUE                                                          TPP15300
C        WRITE LAST PAGE AND TOTALS FOR MORE THAN 20 SIGNIFICANT        TPP15310
C         SOURCES.                                                      TPP15320
      WRITE(IO,1000) HEAD1,HEAD2,HEAD3                                  TPP15330
      WRITE(IO,1040) NPOL,IYR,IDY,LH                                    TPP15340
      WRITE(IO,1050) (MPS(I), I = 21,NSIGP)                             TPP15350
      DO 90 NRE = 1,NRELIM                                              TPP15360
         IF (NRE/50*50 .NE. NRE) GO TO 85                               TPP15370
         WRITE(IO,1000) HEAD1,HEAD2,HEAD3                               TPP15380
         WRITE(IO,1040) NPOL,IYR,IDY,LH                                 TPP15390
         WRITE(IO,1080) (MPS(I), I = 21,NSIGP)                          TPP15400
   85 WRITE(IO,1060) NRE,STAR(1,NRE),STAR(2,NRE),(RNAME(J,NRE),
     1                J = 1,2),(PHSIGS(NRE,I), I = 21,NSIGP)
      WRITE(IO,1070) PHSIGS(NRE,26),PHCHI(NRE)
   90 CONTINUE
      GO TO 999
C
  200 IF ((IOPDHS .EQ. 1) .OR. ((IH12 .NE. 12) .AND. (IENDP .EQ. 0)))
     1                          GO TO 999
C
C* * * * * * * * * * PRINT HOURLY SUMMARIES * * * * * * * * * *
C
      IF (IOPDPH .EQ. 1) GO TO 250
C
C
C         PRINT FINAL PLUME HEIGHT AND DISTANCE TO FINAL RISE
C           (12-HR TABLE).
C
      WRITE(IO,1000) HEAD1,HEAD2,HEAD3
      WRITE(IO,1090) IYR12(1),IDY12(1),LH12(1),IYR12(IH12),
     1               IDY12(IH12),LH12(IH12)
      WRITE(IO,1100) (IDY12(I),LH12(I), I = 1,IH12)
      DO 230 NPT = 1,NPTLIM
         IF (NPT/15*15 .NE. NPT) GO TO 220
         WRITE(IO,1120)
         WRITE(IO,1000) HEAD1,HEAD2,HEAD3
         WRITE(IO,1090) IYR12(1),IDY12(1),LH12(1),IYR12(IH12),
     1                  IDY12(IH12),LH12(IH12)
         WRITE(IO,1100) (IDY12(I),LH12(I), I = 1,IH12)
  220    WRITE(IO,1110) NPT,(PNAME(I,NPT), I = 1,3),
     1          (HSAV12(NPT,I), I = 1,IH12)
      WRITE (IO,1115) (DSAV12(NPT,I), I = 1,IH12)
  230 CONTINUE
      WRITE(IO,1120)
C
C         PRINT HOURLY TOTAL CONCENTRATIONS (12-HR TABLE).
C
  250 WRITE(IO,1000) HEAD1,HEAD2,HEAD3
      WRITE(IO,1130) NPOL,IYR12(1),IDY12(1),LH12(1),IYR12(IH12),
     1               IDY12(IH12),LH12(IH12)
      WRITE(IO,1140) (IDY12(I),LH12(I), I = 1,IH12)
      DO 280 NRE = 1,NRELIM
         IF (NRE/50*50 .NE. NRE) GO TO 270
         WRITE(IO,1000) HEAD1,HEAD2,HEAD3
         WRITE(IO,1130) NPOL,IYR12(1),IDY12(1),LH12(1),IYR12(IH12),
     1                  IDY12(IH12),LH12(IH12)
         WRITE(IO,1140) (IDY12(I), LH12(I), I = 1,IH12)
  270    WRITE(IO,1150) NRE,(RNAME(I,NRE), I = 1,2),
     1                  (CONC12(NRE,I), I = 1,IH12)
  280 CONTINUE
      IENDP = 1
C
  999 RETURN
C
C         FORMAT STATEMENTS.
C
 1000 FORMAT(1H1,'TITLE:  ',20A4,2(/,9X,20A4)/)
 1010 FORMAT(13X,10I11)
 1020 FORMAT('0FINAL HT (M)    ',10(F8.1,3X))
 1030 FORMAT(' DIST FIN HT (KM)',10(F10.3,1X))
 1040 FORMAT(1H0,30X,'* * * ',A4,' CONTRIBUTIONS (MICROGRAMS/M**3) FOR',
     1       ' HOUR ',I2,'-',I3,'-',I2,' * * *')
 1050 FORMAT(1H0,112X,'TOTAL      TOTAL',/,
     1       1X,'  RECEPTOR',8X,31('-'),'SIGNIFICANT SOURCE NUMBER',
     2         31('-'),6X,'SIGNIF       ALL',/,
     3       1X,' NO.   NAME',5X,10(I6,3X))
 1060 FORMAT(1X,I3,2A1,2X,2A4,6P10F9.2)
 1070 FORMAT(1H+,107X,6P2F10.2)
 1080 FORMAT(1H0,'  RECEPTOR',8X,31('-'),'SIGNIFICANT SOURCE NUMBER',
     1         31('-'),/,
     2       1X,' NO.   NAME',5X,10(I6,3X))
 1090 FORMAT(1H0,8X,'* * * FINAL EFFECTIVE PLUME HEIGHTS (HE) AND ',
     1                    'DISTANCES TO FINAL RISE (XF) FOR THE PERIOD ',I2,
     2                    '-',I3,'-',I2,' TO ',I2,'-',I3,'-',I2,' * * *')
 1100 FORMAT(1H0,'------SOURCE------',9X,33('-'),'HE (METERS) AND XF ',
     1                   '(KILOMETERS) BY HOUR',33('-'),/,
     2           1X,1X,'#  NAME',14X,12(3X,I3,'-',I2))
 1110 FORMAT(1H0,I3,1X,3A4,2X,'HE',1X,12F9.1)
 1115 FORMAT (21X,'XF',1X,12F9.3)
 1120 FORMAT(1H0,'HE = FINAL EFFECTIVE PLUME HEIGHT IN METERS',/,
     1           1X,'XF = DISTANCE TO FINAL RISE IN KILOMETERS')
 1130 FORMAT(1H0,29X,'* * * ',A4,' CONCENTRATIONS FOR THE PERIOD ',I2,
     1                   '-',I3,'-',I2,' TO ',I2,'-',I3,'-',I2,' * * *')
 1140 FORMAT(1H0,'---RECEPTOR---',8X,33('-'),'CONCENTRATIONS ',
     1                   '(MICROGRAMS/M**3) BY HOUR',33('-'),/,
     2           1X,' NO.   NAME',9X,12(3X,I3,'-',I2),/)
 1150 FORMAT(I4,3X,2A4,6X,6P12F9.1)
      END
      SUBROUTINE TP370(MISG,IYR,IDY,LH)
C         370-UPDATE-HI5-TABLES
C
C         ARGUMENT LIST:
C           INPUT:  MISG  - MISSING CODE (IF MISG > 0, THEN MISSING)
C                   IYR   - YEAR TO SIMULATE
C                   IDY   - JULIAN DAY TO SIMULATE
C                   LH    - HOUR TO SIMULATE
C
C         CALLING ROUTINES:
C           TP240
C
C         SUBPROGRAMS CALLED:
C           TP420
C
C         DESCRIPTION:
C           THE TASK OF THIS SUBROUTINE IS TO UPDATE THE HI-5 TABLE.
C           TP370 CALL MODULE TP420 TO ARRANGE CONCENTRATIONS OF VARIOUS
C           AVERAGING TIMES INTO HIGH-5 TABLES.
C
      PARAMETER (NPTMAX=25,NREMAX=180)
      COMMON /RECCOM/ELR(NREMAX),PARTC(NREMAX,NPTMAX),PCHI(NREMAX),
     1               PHCHI(NREMAX),PHSIGS(NREMAX,26),PSIGS(NREMAX,26),
     2               RNAME(2,NREMAX),RREC(NREMAX),SREC(NREMAX),
     3               STAR(2,NREMAX),ZR(NREMAX),NRELIM
      COMMON /TABCOM/CONC(NREMAX,5),HMAXA(5,NREMAX,5),SUM(NREMAX),
     1               HSAV12(NPTMAX,12),DSAV12(NPTMAX,12),
     2               CONC12(NREMAX,12),NA3,NA8,NA24,NAX,NAV5,NAVT,NP3,
     3               NP8,NP24,NPX,NPER3,NPER8,NPER24,NPERX,NTAH,NVAL3,
     4               NVAL8,NVAL24,NVALX,NSUPL(5,NREMAX,5),NTIME(5),
     5               IYR12(12),IDY12(12),LH12(12)
C
      IF (MISG .GT. 0) GO TO 100
C
C         CUMULATE FOR PERIOD OF RECORD CONCENTRATIONS.
C
      DO 20 NRE = 1,NRELIM
         DUM = PHCHI(NRE)
         DO 10 L = 1,NAVT
            CONC(NRE,L) = CONC(NRE,L) + DUM
   10    CONTINUE
         SUM(NRE) = SUM(NRE) + DUM
   20 CONTINUE
C        NA  IS THE ACTUAL HOURS CONTRIBUTING TO EACH AVERAGING PERIOD.
      NA3 = NA3 + 1
      NA8 = NA8 + 1
      NA24 = NA24 + 1
      NAX = NAX + 1
C
C         1-HR CONCENTRATIONS.
C
      L = 1
      NAT = 1
C         RANK 1-HR CONCENTRATIONS.
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      CALL TP420(L,IYR,IDY,LH,NAT)                                      TPP16810
      DO 30 NRE = 1,NRELIM                                              TPP16820
         CONC(NRE,1) = 0.0                                              TPP16830
   30 CONTINUE                                                          TPP16840
C                                                                       TPP16850
C         3-HR CONCENTRATIONS.                                          TPP16860
C                                                                       TPP16870
  100 NP3 = NP3 + 1                                                     TPP16880
C         NP  IS RUNNING COUNT OF HOURS COMPLETED (MISSING OR NOT) FOR  TPP16890
C           EACH AVERAGING PERIOD.                                      TPP16900
      IF (NP3 .NE. 3) GO TO 200                                         TPP16910
      IF (NA3 .LT. NVAL3) GO TO 120                                     TPP16920
C         NVAL  IS THE VALIDITY CRITERIA FOR EACH AVERAGING PERIOD.     TPP16930
C           THERE MUST BE THIS MANY OR MORE HOURS OF DATA TO MAKE A     TPP16940
C           CALCULATION FOR THIS AVERAGING PERIOD.                      TPP16950
      DO 110 NRE = 1,NRELIM                                             TPP16960
         CONC(NRE,2) = CONC(NRE,2)/NA3                                  TPP16970
  110 CONTINUE                                                          TPP16980
      L = 2                                                             TPP16990
      NAT = NA3                                                         TPP17000
C         RANK 3-HR CONCENTRATIONS.                                     TPP17010
      CALL TP420(L,IYR,IDY,LH,NAT)                                      TPP17020
      NPER3 = NPER3 + 1                                                 TPP17030
C         NPER  IS THE TOTAL NUMBER OF PERIODS CONSIDERED BY RANK FOR   TPP17040
C           THIS  PERIOD OF RECORD.                                     TPP17050
  120 NP3 = 0                                                           TPP17060
      NA3 = 0                                                           TPP17070
      DO 130 NRE = 1,NRELIM                                             TPP17080
         CONC(NRE,2) = 0.0                                              TPP17090
  130 CONTINUE                                                          TPP17100
C                                                                       TPP17110
C         8-HR CONCENTRATIONS.                                          TPP17120
C                                                                       TPP17130
  200 NP8 = NP8 + 1                                                     TPP17140
      IF (NP8 .NE. 8) GO TO 300                                         TPP17150
      IF (NA8 .LT. NVAL8) GO TO 220                                     TPP17160
      DO 210 NRE = 1,NRELIM                                             TPP17170
         CONC(NRE,3) = CONC(NRE,3)/NA8                                  TPP17180
  210 CONTINUE                                                          TPP17190
      L = 3                                                             TPP17200
      NAT = NA8                                                         TPP17210
C         RANK 8-HR CONCENTRATIONS.                                     TPP17220
      CALL TP420(L,IYR,IDY,LH,NAT)                                      TPP17230
      NPER8 = NPER8 + 1                                                 TPP17240
  220 NP8 = 0                                                           TPP17250
      NA8 = 0                                                           TPP17260
      DO 230 NRE = 1,NRELIM                                             TPP17270
         CONC(NRE,3) = 0.0                                              TPP17280
  230 CONTINUE                                                          TPP17290
C                                                                       TPP17300
C         24-HR CONCENTRATIONS.                                         TPP17310
C                                                                       TPP17320
  300 NP24 = NP24 + 1                                                   TPP17330
      IF (NP24 .NE. 24) GO TO 400                                       TPP17340
      IF (NA24 .LT. NVAL24) GO TO 320                                   TPP17350
      DO 310 NRE = 1,NRELIM                                             TPP17360
         CONC(NRE,4) = CONC(NRE,4)/NA24                                 TPP17370
  310 CONTINUE                                                          TPP17380
      L = 4                                                             TPP17390
      NAT = NA24                                                        TPP17400
C         RANK 24-HR CONCENTRATIONS.                                    TPP17410
      CALL TP420(L,IYR,IDY,LH,NAT)                                      TPP17420
      NPER24 = NPER24 + 1                                               TPP17430
  320 NP24 = 0                                                          TPP17440
      NA24 = 0                                                          TPP17450
      DO 330 NRE = 1,NRELIM                                             TPP17460
         CONC(NRE,4) = 0.0                                              TPP17470
  330 CONTINUE                                                          TPP17480
C                                                                       TPP17490
C         CHECK FOR USER-SPECIFIED AVERAGING TIME.                      TPP17500
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C                                                                       TPP17510
  400 IF (NAVT .EQ. 4) GO TO 999                                        TPP17520
C                                                                       TPP17530
C          USER-SPECIFIED AVERAGING-TIME CONCENTRATIONS.                TPP17540
C                                                                       TPP17550
      NPX = NPX + 1                                                     TPP17560
      IF (NPX .NE. NAV5) GO TO 999                                      TPP17570
      IF (NAX .LT. NVALX) GO TO 420                                     TPP17580
      DO 410 NRE = 1,NRELIM                                             TPP17590
         CONC(NRE,5) = CONC(NRE,5)/NAX                                  TPP17600
  410 CONTINUE                                                          TPP17610
      L = 5                                                             TPP17620
      NAT = NAX                                                         TPP17630
C          RANK USER-SPECIFIED AVERAGING-TIME CONCENTRATIONS.           TPP17640
      CALL TP420(L,IYR,IDY,LH,NAT)                                      TPP17650
      NPERX = NPERX + 1                                                 TPP17660
  420 NPX = 0                                                           TPP17670
      NAX = 0                                                           TPP17680
      DO 430 NRE = 1,NRELIM                                             TPP17690
         CONC(NRE,5) = 0.0                                              TPP17700
  430 CONTINUE                                                          TPP17710
C                                                                       TPP17720
  999 RETURN                                                            TPP17730
      END                                                               TPP17740
      SUBROUTINE TP420(L,IYR,IDY,LH,NAT)                                TPP17750
C        420-RANK-CONCENTRATIONS                                        TPP17760
C                                                                       TPP17770
C        ARGUMENT LIST:                                                 TPP17780
C          INPUT:  L    - AVERAGING TIME (1=PERIOD OF RECORD, 2=3-HOUR, TPP17790
C                         3=8-HOUR, 4=24-HOUR, 5=USER SPECIFIED         TPP17800
C                         AVERAGING TIME)                               TPP17810
C                  IYR  - YEAR TO SIMULATE                              TPP17820
C                  IDY  - DAY TO SIMULATION                             TPP17830
C                  LH   - HOUR TO SIMULATION                            TPP17840
C                  NAT  - ACTUAL NUMBER OF HOURS IN CONCENTRATION       TPP17850
C                                                                       TPP17860
C        CALLING ROUTINES:                                              TPP17870
C          TP370                                                        TPP17880
C                                                                       TPP17890
C        DESCRIPTION:                                                   TPP17900
C          THIS MODULE IS CALLED BY TP370 TO ARRANGE CONCENTRATIONS OF  TPP17910
C          VARIOUS AVERAGING TIMES INTO HIGH-FIVE TABLES.  THESE TABLES TPP17920
C          ARE ARRAYS WHICH STORE THE HIGHEST FIVE CONCENTRATIONS FOR   TPP17930
C          EACH RECEPTOR FOR EACH AVERAGING TIME.                       TPP17940
C                                                                       TPP17950
C        DEFINITIONS OF IMPORTANT VARIABLES:                            TPP17960
C          HMAXA(J,NRE,L) - CONCENTRATIONS ACCORDING TO                 TPP17970
C                           J:     RANK OF CONC. (1-5)                  TPP17980
C                           NRE:   RECEPTOR NUMBER                      TPP17990
C                           L:     AVERAGING TIME                       TPP18000
C          NSUPL(J,NRE,L) - YEAR,DAY,HOUR AND NO. OF VALID HOURS        TPP18010
C                           (YYDDDHHVV) RELATED TO CONCENTRATION.       TPP18020
C                                                                       TPP18030
      PARAMETER (NPTMAX=25,NREMAX=180)                                  TPP18040
      COMMON /RECCOM/ELR(NREMAX),PARTC(NREMAX,NPTMAX),PCHI(NREMAX),     TPP18050
     1               PHCHI(NREMAX),PHSIGS(NREMAX,26),PSIGS(NREMAX,26),  TPP18060
     2               RNAME(2,NREMAX),RREC(NREMAX),SREC(NREMAX),         TPP18070
     3               STAR(2,NREMAX),ZR(NREMAX),NRELIM                   TPP18080
      COMMON /TABCOM/CONC(NREMAX,5),HMAXA(5,NREMAX,5),SUM(NREMAX),      TPP18090
     1               HSAV12(NPTMAX,12),DSAV12(NPTMAX,12),               TPP18100
     2               CONC12(NREMAX,12),NA3,NA8,NA24,NAX,NAV5,NAVT,NP3,  TPP18110
     3               NP8,NP24,NPX,NPER3,NPER8,NPER24,NPERX,NTAH,NVAL3,  TPP18120
     4               NVAL8,NVAL24,NVALX,NSUPL(5,NREMAX,5),NTIME(5),     TPP18130
     5               IYR12(12),IDY12(12),LH12(12)                       TPP18140
C                                                                       TPP18150
      DO 100 NRE = 1,NRELIM                                             TPP18160
         IF (CONC(NRE,L) .LE. HMAXA(5,NRE,L)) GO TO 100                 TPP18170
         J = 1                                                          TPP18180
   10    IF (CONC(NRE,L) .GT. HMAXA(J,NRE,L)) GO TO 20                  TPP18190
C            CONCENTRATION IS ONE OF THE TOP FIVE.                      TPP18200
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         J = J + 1
         GO TO 10
C           THE FOLLOWING LOOP HAS THE EFFECT OF INSERTING A NEW
C            CONCENTRATION ENTRY INTO ITS PROPER POSITION WHILE SHIFTING
C            DOWN THE 'OLD' LOWER CONCENTRATIONS THUS ESTABLISHING THE
C            'HIGH-FIVE' CONCENTRATION TABLE.   NCODE AND THE ARRAY
C            NSUPL MUST BE ABLE TO HOLD 9-DIGIT INTEGERS.
   20    NCODE = IYR * 10000000 + IDY * 10000 + LH * 100 + NAT
         IF (J .EQ. 5) GO TO 40
         IJ = 4
   30    IJP1 = IJ + 1
         HMAXA(IJP1,NRE,L) = HMAXA(IJ,NRE,L)
         NSUPL(IJP1,NRE,L) = NSUPL(IJ,NRE,L)
         IF (IJ .EQ. J) GO TO 40
         IJ = IJ - 1
         GO TO 30
   40    HMAXA(J,NRE,L) = CONC(NRE,L)
         NSUPL(J,NRE,L) = NCODE
  100 CONTINUE
C
      RETURN
      END
      SUBROUTINE TP380(KAAVG,IYR,IDY,LH)
C        380-OUTPUT-AVERAGED-RESULTS
C
C        ARGUMENT LIST:
C          INPUT:  KAAVG   - NUMBER OF HOURS IN AVERAGE
C                  IYR     - YEAR TO SIMULATE
C                  IDY     - DAY TO SIMULATE
C                  LH      - HOUR TO SIMULATE
C
C        CALLING ROUTINES:
C          TP240
C
C        DESCRIPTION:
C          THIS SUBROUTINE PROVIDES CONCENTRATION OUTPUT FOR THE
C          AVERAGING PERIOD IN TWO WAYS:
C            (1)  CONTRIBUTIONS FROM SIGNIFICANT SOURCES, AND
C            (2)  SUMMARIES.
C
C          NOTE THAT CONCENTRATIONS ARE OUTPUT IN MICROGRAMS/M**3 BY
C          USING A "6P" SCALE FACTOR IN FORMAT STATEMENTS 1030, 1040,
C          AND 1080.
C
      PARAMETER (NPTMAX=25,NREMAX=180)
      DIMENSION IRANK(NREMAX),CSAV(NREMAX)
      COMMON /RUNCOM/CONTWO,CEIM,HAFL,CONTER(4),IYRS,IDYS,IHRS,IHLIM,
     1               IOPT,IOPB,IOPD,IOPG,IOPM,IOPQ,IOPS,IOPR,IOPDHC,
     2               IOPDPC,IOPDHS,IOPDPH,IOPDAC,IOPDAS,IOPDHI,IFILE,
     3               NPER,NAVG,HEAD1(20),HEAD2(20),HEAD3(20),LINE1(20),
     4               LINE2(20),LINE3(20),NPOL
      COMMON /SORCOM/D(NPTMAX),PNAME(3,NPTMAX),PSH(NPTMAX),QJ(NPTMAX),
     1               QELEV(NPTMAX),QEAST(NPTMAX),QNORD(NPTMAX),
     2               SIGP(NPTMAX),TS(NPTMAX),VS(NPTMAX),HSAV(NPTMAX),
     3               DSAV(NPTMAX),NPTLIM,NSIGP,INPT,IMPS(NPTMAX),
     4               IPSIGS(NPTMAX),MPS(NPTMAX)
      COMMON /RECCOM/ELR(NREMAX),PARTC(NREMAX,NPTMAX),PCHI(NREMAX),
     1               PHCHI(NREMAX),PHSIGS(NREMAX,26),PSIGS(NREMAX,26),
     2               RNAME(2,NREMAX),RREC(NREMAX),SREC(NREMAX),
     3               STAR(2,NREMAX),ZR(NREMAX),NRELIM
      COMMON /INOUT/ IN,IO,ICF
C
      DO 20 NRE = 1,NRELIM
         PCHI(NRE) = PCHI(NRE)/KAAVG
         CSAV(NRE) = PCHI(NRE)
         DO 10 I = 1,26
            PSIGS(NRE,I) = PSIGS(NRE,I)/KAAVG
   10    CONTINUE
   20 CONTINUE
C
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C         IF IOPDAC = 1, THEN SKIP OUTPUT OF AVERAGED CONTRIBUTIONS.    TPP18910
      IF (IOPDAC .EQ. 1) GO TO 200                                      TPP18920
C                                                                       TPP18930
C         PRINT AVERAGING-TIME SIGNIFICANT SOURCE CONTRIBUTIONS.        TPP18940
C                                                                       TPP18950
      IF (NSIGP .GT. 10) GO TO 40                                       TPP18960
C         PRINT FIRST PAGE OF OUTPUT AND TOTALS FOR 10 OR LESS          TPP18970
C          SIGNIFICANT SOURCES.                                         TPP18980
      WRITE(IO,1000) HEAD1,HEAD2,HEAD3                                  TPP18990
      WRITE(IO,1010) NAVG,NPOL,IYR,IDY,LH,KAAVG                         TPP19000
      WRITE(IO,1020) (MPS(I), I = 1,NSIGP)                              TPP19010
      DO 30 NRE = 1,NRELIM                                              TPP19020
         IF (NRE/50*50 .NE. NRE) GO TO 25                               TPP19030
         WRITE(IO,1000) HEAD1,HEAD2,HEAD3                               TPP19040
         WRITE(IO,1010) NAVG,NPOL,IYR,IDY,LH,KAAVG                      TPP19050
         WRITE(IO,1020) (MPS(I), I = 1,NSIGP)                           TPP19060
   25    WRITE(IO,1030) NRE,STAR(1,NRE),STAR(2,NRE),(RNAME(J,NRE),      TPP19070
     1                  J = 1,2),(PSIGS(NRE,I), I = 1,NSIGP)            TPP19080
         WRITE(IO,1040) PSIGS(NRE,26),PCHI(NRE)                         TPP19090
   30 CONTINUE                                                          TPP19100
      GO TO 200                                                         TPP19110
C         PRINT FIRST PAGE FOR MORE THAN 10 SIGNIFICANT SOURCES.        TPP19120
   40 WRITE(IO,1000) HEAD1,HEAD2,HEAD3                                  TPP19130
      WRITE(IO,1010) NAVG,NPOL,IYR,IDY,LH,KAAVG                         TPP19140
      WRITE(IO,1050) (MPS(I), I = 1,10)                                 TPP19150
      DO 50 NRE = 1,NRELIM                                              TPP19160
         IF (NRE/50*50 .NE. NRE) GO TO 45                               TPP19170
         WRITE(IO,1000) HEAD1,HEAD2,HEAD3                               TPP19180
         WRITE(IO,1010) NAVG,NPOL,IYR,IDY,LH,KAAVG                      TPP19190
         WRITE(IO,1050) (MPS(I), I = 1,10)                              TPP19200
   45    WRITE(IO,1030) NRE,STAR(1,NRE),STAR(2,NRE),(RNAME(J,NRE),      TPP19210
     1                  J = 1,2),(PSIGS(NRE,I), I = 1,10)               TPP19220
   50 CONTINUE                                                          TPP19230
      IF (NSIGP .GT. 20) GO TO 70                                       TPP19240
C         PRINT SECOND PAGE AND TOTALS FOR 11 TO 20 SIGNIFICANT SOURCES.TPP19250
      WRITE(IO,1000) HEAD1,HEAD2,HEAD3                                  TPP19260
      WRITE(IO,1010) NAVG,NPOL,IYR,IDY,LH,KAAVG                         TPP19270
      WRITE(IO,1020) (MPS(I), I = 11,NSIGP)                             TPP19280
      DO 60 NRE = 1,NRELIM                                              TPP19290
         IF (NRE/50*50 .NE. NRE) GO TO 55                               TPP19300
         WRITE(IO,1000) HEAD1,HEAD2,HEAD3                               TPP19310
         WRITE(IO,1010) NAVG,NPOL,IYR,IDY,LH,KAAVG                      TPP19320
         WRITE(IO,1020) (MPS(I), I = 11,NSIGP)                          TPP19330
   55    WRITE(IO,1030) NRE,STAR(1,NRE),STAR(2,NRE),(RNAME(J,NRE),      TPP19340
     1                  J = 1,2),(PSIGS(NRE,I), I = 11,NSIGP)           TPP19350
         WRITE(IO,1040) PSIGS(NRE,26),PCHI(NRE)                         TPP19360
   60 CONTINUE                                                          TPP19370
      GO TO 200                                                         TPP19380
C         WRITE SECOND PAGE FOR MORE THAN 20 SIGNIFICANT SOURCES.       TPP19390
   70 WRITE(IO,1000) HEAD1,HEAD2,HEAD3                                  TPP19400
      WRITE(IO,1010) NAVG,NPOL,IYR,IDY,LH,KAAVG                         TPP19410
      WRITE(IO,1050) (MPS(I), I = 11,20)                                TPP19420
      DO 80 NRE = 1,NRELIM                                              TPP19430
         IF (NRE/50*50 .NE. NRE) GO TO 75                               TPP19440
         WRITE(IO,1000) HEAD1,HEAD2,HEAD3                               TPP19450
         WRITE(IO,1010) NAVG,NPOL,IYR,IDY,LH,KAAVG                      TPP19460
         WRITE(1050) (MPS(I), I = 11,20)                                TPP19470
   75    WRITE(IO,1030) NRE,STAR(1,NRE),STAR(2,NRE),(RNAME(J,NRE),      TPP19480
     1                  J = 1,2),(PSIGS(NRE,I), I = 11,20)              TPP19490
   80 CONTINUE                                                          TPP19500
C         WRITE LAST PAGE AND TOTALS FOR MORE THAN 20 SIGNIFICANT       TPP19510
C          SOURCES.                                                     TPP19520
      WRITE(IO,1000) HEAD1,HEAD2,HEAD3                                  TPP19530
      WRITE(IO,1010) NAVG,NPOL,IYR,IDY,LH,KAAVG                         TPP19540
      WRITE(IO,1020) (MPS(I), I = 21,NSIGP)                             TPP19550
      DO 90 NRE = 1,NRELIM                                              TPP19560
         IF (NRE/50*50 .NE. NRE) GO TO 85                               TPP19570
         WRITE(IO,1000) HEAD1,HEAD2,HEAD3                               TPP19580
         WRITE(IO,1010) NAVG,NPOL,IYR,IDY,LH,KAAVG                      TPP19590
         WRITE(IO,1020) (MPS(I), I = 21,NSIGP)                          TPP19600
   85    WRITE(IO,1030) NRE,STAR(1,NRE),STAR(2,NRE),(RNAME(J,NRE),
     1                  J = 1,2),(PSIGS(NRE,I), I = 21,NSIGP)
         WRITE(IO,1040) PSIGS(NRE,26),PCHI(NRE)
   90 CONTINUE
C
C
C        PRINT AVERAGING-TIME SUMMARY.
C
C        IF IOPDAS = 1, THEN SKIP OUTPUT OF THE AVERAGED SUMMARIES.
  200 IF (IOPDAS .EQ. 1) GO TO 999
      WRITE(IO,1000) HEAD1,HEAD2,HEAD3
      WRITE(IO,1060) NAVG,NPOL,IYR,IDY,LH,KAAVG
      WRITE(IO,1070)
C
C        CALCULATE GRAND TOTALS AND RANK CONCENTRATIONS.
C
      DO 220 I = 1,NRELIM
         CMAX = -1.0
         DO 210 K = 1,NRELIM
            IF (CSAV(K) .LE. CMAX) GO TO 210
            CMAX = CSAV(K)
            LMAX = K
  210    CONTINUE
         IRANK(LMAX) = I
         CSAV(LMAX) = -1.0
  220 CONTINUE
      DO 230 NRE = 1,NRELIM
         IF (NRE/50*50 .NE. NRE) GO TO 225
         WRITE(IO,1000) HEAD1,HEAD2,HEAD3
         WRITE(IO,1060) NAVG,NPOL,IYR,IDY,LH,KAAVG
         WRITE(IO,1070)
  225    WRITE(IO,1080) NRE,(RNAME(J,NRE), J = 1,2),RREC(NRE),SREC(NRE),
     1                  ELR(NRE),STAR(1,NRE),STAR(2,NRE),ZR(NRE),
     2                  PCHI(NRE),IRANK(NRE)
  230 CONTINUE
C
  999 RETURN
C
C        FORMAT STATEMENTS.
C
 1000 FORMAT(1H1,'TITLE:  ',20A4,2(/,9X,20A4)/)
 1010 FORMAT(1H0,9X,'* * * ',I3,'-HR AVERAGE ',A4,' CONTRIBUTIONS ',
     1           ,(MICROGRAMS/M**3) FOR HOUR ENDING ',I2,'-',I3,'-',I2,
     2           ,' -- ',I4,' VALID HOURS * * *')
 1020 FORMAT(1H0,112X,'TOTAL       TOTAL',/,
     1         1X,'  RECEPTOR',8X,31('-'),'SIGNIFICANT SOURCE NUMBER',
     2           31('-'),6X,'SIGNIF          ALL',/,
     3         1X,' NO.    NAME',5X,10(I6,3X))
 1030 FORMAT(1X,I3,2A1,2X,2A4,6P10F9.2)
 1040 FORMAT(1H+,107X,6P2F10.2)
 1050 FORMAT(1H0,'  RECEPTOR',8X,31('-'),'SIGNIFICANT SOURCE NUMBER',
     1           31('-'),/,
     2         1X,' NO.    NAME',5X,10(I6,3X))
 1060 FORMAT(1H0,9X,'* * * ',I3,'-HR AVERAGE ',A4,' CONCENTRATION ',
     1           'TABLE FOR HOUR ENDING ',I2,'-',I3,'-',I2,' -- ',I4,
     2           ,' VALID HOURS * * *')
 1070 FORMAT(1H0,'RECEPTOR     IDENTIFICATION              ------------COORDI',
     1           'NATES------------            HEIGHT ABOVE',/,
     2        1X,45X,'(USER UNITS)',16X,'LOCAL GRD-LVL'     ',
     3           'CONCENTRATION        RANK',/,
     4        1X,38X,'EAST           NORTH           ELEV          (M)',9X,
     5           '(MICROGRAMS/M**3)')
 1080 FORMAT(1X,I5,10X,2A4,6X,3F13.2,1X,2A1,1X,F9.2,8X,6PF13.2,7X,I5)
      END
      SUBROUTINE TP390(NHR,IYR,IDY,LH)
C        390-OUTPUT-HI5-TABLES
C
C        ARGUMENT LIST:
C           INPUT:  NPOL   - POLLUTANT NAME
C                   NHR    - TOTAL NUMBER OF HOURS CONSIDERED
C                   IYR    - YEAR TO SIMULATE
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C
C                  IDY    - DAY TO SIMULATE
C                  LH     - HOUR TO SIMULATE
C
C        CALLING ROUTINES:
C           TP240
C
C        DESCRIPTION:
C           THIS MODULE OUTPUTS THE HI-5 TABLE FOR EACH AVERAGING PERIOD.
C           NOTE THAT CONCENTRATIONS ARE OUTPUT IN MICROGRAMS/M**3 BY
C           USING A "6P" SCALE FACTOR IN FORMAT STATEMENTS 1030 AND 1050.
C
      PARAMETER (NPTMAX=25,NREMAX=180)
      DIMENSION FRAN(5),NPP(5),NA(5),STARH5(2,NREMAX)
      COMMON /RUNCOM/CONTWO,CELM,HAFL,CONTER(4),IYRS,IDYS,IHRS,IHLIM,
     1               IOPT,IOPB,IOPD,IOPG,IOPM,IOPQ,IOPS,IOPR,IOPDHC,
     2               IOPDPC,IOPDHS,IOPDPH,IOPDAC,IOPDAS,IOPDHI,IFILE,
     3               NPER,NAVG,HEAD1(20),HEAD2(20),HEAD3(20),LINE1(20),
     4               LINE2(20),LINE3(20),NPOL
      COMMON /RECCOM/ELR(NREMAX),PARTC(NREMAX,NPTMAX),PCHI(NREMAX),
     1               PHCHI(NREMAX),PHSIGS(NREMAX,26),PSIGS(NREMAX,26),
     2               RNAME(2,NREMAX),RREC(NREMAX),SREC(NREMAX),
     3               STAR(2,NREMAX),ZR(NREMAX),NRELIM
      COMMON /TABCOM/CONC(NREMAX,5),HMAXA(5,NREMAX,5),SUM(NREMAX),
     1               HSAV12(NPTMAX,12),DSAV12(NPTMAX,12),
     2               CONC12(NREMAX,12),NA3,NA8,NA24,NAX,NAV5,NAVT,NP3,
     3               NP8,NP24,NPX,NPER3,NPER8,NPER24,NPERX,NTAH,NVAL3,
     4               NVAL8,NVAL24,NVALX,NSUPL(5,NREMAX,5),NTIME(5),
     5               IYR12(12),IDY12(12),LH12(12)
      COMMON /INOUT/ IN,IO,ICF
      DATA STR/'*'/,BLNK/' '/
C
C        INITIALIZE.
C
      NA(1) = NTAH
      NA(2) = NPER3
      NA(3) = NPER8
      NA(4) = NPER24
      NA(5) = NPERX
      NDUM = NPER * NAVG
      NPP(1) = NDUM
      NPP(2) = NDUM/3
      NPP(3) = NDUM/8
      NPP(4) = NDUM/24
      NPP(5) = NDUM/NAV5
      DO 10 N = 1,NAVT
         A = NA(N)
         B = NPP(N)
         FRAN(N) = A/B
   10 CONTINUE
      DO 20 NRE = 1,NRELIM
         STARH5(1,NRE) = BLNK
         STARH5(2,NRE) = BLNK
   20 CONTINUE
C
C        INITIALIZE PERIODIC CONCENTRATION TO BEGIN RANKING PERIODIC
C         MAXIMUM.
C
      SUM(1) = SUM(1)/NTAH
      HIMAX = SUM(1)
      KMX = 1
C
C        FIND HIGHEST AVERAGE CONCENTRATION AMONG RECEPTORS.
C
      DO 50 NRE = 2,NRELIM
         SUM(NRE) = SUM(NRE)/NTAH
         IF (SUM(NRE) .LE. HIMAX) GO TO 50
         KMX = NRE
         HIMAX = SUM(NRE)
   50 CONTINUE
      STARH5(1,KMX) = STR
      WRITE(IO,1000) HEAD1,HEAD2,HEAD3                                  TPP21010
      WRITE(IO,1010) NPOL,IYRS,IDYS,IHRS,IYR,IDY,LH,NTAH,NHR,           TPP21020
     1               FRAN(1)                                            TPP21030
      WRITE(IO,1020)                                                    TPP21040
      DO 60 NRE = 1,NRELIM                                              TPP21050
         IF (NRE/50*50 .NE. NRE) GO TO 55                               TPP21060
         WRITE(IO,1000) HEAD1,HEAD2,HEAD3                               TPP21070
         WRITE(IO,1010) NPOL,IYRS,IDYS,IHRS,IYR,IDY,LH,NTAH,NHR,        TPP21080
     1                  FRAN(1)                                         TPP21090
         WRITE(IO,1020)                                                 TPP21100
   55    WRITE(IO,1030) NRE,(RNAME(J,NRE), J = 1,2),RREC(NRE),SREC(NRE),TPP21110
     1                  ZR(NRE),ELR(NRE),SUM(NRE),STARH5(1,NRE)         TPP21120
   60 CONTINUE                                                          TPP21130
      STARH5(1,KMX) = BLNK                                              TPP21140
C                                                                       TPP21150
C        LOOP TO WRITE HIGH-FIVE TABLE FOR 4 OR 5 AVG TIMES.            TPP21160
C                                                                       TPP21170
      DO 300 L = 1,NAVT                                                 TPP21180
C        ASTERISKS DEPICT RECEPTORS WITH HIGHEST AND SECOND HIGHEST     TPP21190
C           CONCENTRATIONS.                                             TPP21200
         K1 = 1                                                         TPP21210
         K2 = 1                                                         TPP21220
         HI1 = HMAXA(1,1,L)                                             TPP21230
         HI2 = HMAXA(2,1,L)                                             TPP21240
         DO 200 NRE = 2,NRELIM                                          TPP21250
            IF (HMAXA(1,NRE,L) .LE. HI1) GO TO 110                      TPP21260
            HI1 = HMAXA(1,NRE,L)                                        TPP21270
            K1 = NRE                                                    TPP21280
  110       IF (HMAXA(2,NRE,L) .LE. HI2) GO TO 200                      TPP21290
            HI2 = HMAXA(2,NRE,L)                                        TPP21300
            K2 = NRE                                                    TPP21310
  200    CONTINUE                                                       TPP21320
         STARH5(1,K1) = STR                                             TPP21330
         STARH5(2,K2) = STR                                             TPP21340
         WRITE(IO,1000) HEAD1,HEAD2,HEAD3                               TPP21350
         WRITE(IO,1040) NTIME(L),NPOL,NA(L),NPP(L),FRAN(L),             TPP21360
     1                  (I, I = 1,5)                                    TPP21370
         DO 250 NRE = 1,NRELIM                                          TPP21380
            IF (NRE/50*50 .NE. NRE) GO TO 240                           TPP21390
            WRITE(IO,1000) HEAD1,HEAD2,HEAD3                            TPP21400
            WRITE(IO,1040) NTIME(L),NPOL,NA(L),NPP(L),FRAN(L),          TPP21410
     1                     (I, I = 1,5)                                 TPP21420
  240       WRITE(IO,1050) NRE,RREC(NRE),SREC(NRE),(HMAXA(J,NRE,L),     TPP21430
     1                     STARH5(J,NRE),NSUPL(J,NRE,L), J = 1,2),      TPP21440
     2                     (HMAXA(J,NRE,L),NSUPL(J,NRE,L), J = 3,5)     TPP21450
  250    CONTINUE                                                       TPP21460
C           INITIALIZE ASTERISK STORAGE TO BLANKS.                      TPP21470
         STARH5(1,K1) = BLNK                                            TPP21480
         STARH5(2,K2) = BLNK                                            TPP21490
  300 CONTINUE                                                          TPP21500
C                                                                       TPP21510
      RETURN                                                            TPP21520
C                                                                       TPP21530
C        FORMAT STATEMENTS.                                             TPP21540
C                                                                       TPP21550
 1000 FORMAT(1H1,'TITLE:  ',20A4,2(/,9X,20A4)/)                         TPP21560
 1010 FORMAT(1H0,15X,'* * * AVERAGE ',A4,' CONCENTRATIONS FOR ',         TPP21570
     1           'THE PERIOD ',I2,'-',I3,'-',I2,' TO ',I2,'-',I3,'-',I2, TPP21580
     2           ' * * *',/,                                            TPP21590
     3          1X,32X,'(VALID PERIODS/POSSIBLE = ',I4,'/',I4,' = ',F6.4)TPP21600
 1020 FORMAT(1H0,'RECEPTOR    IDENTIFICATION        ------------COORDI',TPP21610
     1           'NATES------------      HEIGHT ABOVE',/,               TPP21620
     2          1X,43X,'(USER UNITS)',18X,'LOCAL GRD-LVL      ',        TPP21630
     3           'CONCENTRATION',/,                                     TPP21640
     4          1X,38X,'EAST     NORTH          ELEV           (M)',10X,TPP21650
     5           '(MICROGRAMS/M**3)')                                   TPP21660
 1030 FORMAT(1X,I5,10X,2A4,6X,3F13.2,4X,F9.2,8X,6PF13.2,1X,A1)          TPP21670
 1040 FORMAT(1H0,29X,'* * * FIVE HIGHEST ',I3,'-HR ',A4,' CONCENTRA',   TPP21680
     1           'TIONS (MICROGRAMS/M**3) * * *',/,                     TPP21690
     2         1X,41X,'(VALID PERIODS/POSSIBLE = ',I4,'/',I4,' = ',F6.4,/TPP21700
     3        1H0,56X,'FIVE HIGHEST CONCENTRATIONS AT EACH RECEPTOR',/,
     4         1X,'--------RECEPTOR--------',4X,5('--------',I1,'--------',
     5           4X),/
     6         1X,'NO.        LOCATION',6X,5(4X,'CONC.  ENDING VAL'),/,
     7         1X,22X,5(12X,'YRJDYHR #'))
 1050 FORMAT(1X,I3,' (',F8.2,',',F8.2,')',2(6PF9.2,A1,'(',I9,')'),
     1          3(6PF9.2,' (',I9,')'))
      END
      SUBROUTINE CHRON(IYR,IJD,IHR,IYDH)
C
C         CHRON-CONVERT-DATE
C
C         ARGUMENT LIST:
C           INPUT:   IYR  - YEAR (2 DIGITS)
C                    IJD  - JULIAN DAY (3 DIGITS)
C                    IHR  - HOUR (2 DIGITS)
C           OUTPUT:  IYDH - DATE CONVERTED TO HOUR
C
C         CALLING ROUTINES:
C           TP240, TP340
C
C         DESCRIPTION:
C           THIS SUBROUTINE CONVERTS DATES BETWEEN 1960 AND 1999 TO A
C           COMMON SEQUENTIAL HOUR.  THE ZERO POINT IS 1959, 365, 24,
C           I.E., HOUR 1 IS THE FIRST HOUR OF 1960.

      DIMENSION ICUM(41),NDAY(40)
      COMMON /INOUT/ IN,IO,ICF
      DATA ICUM/     0,  8784, 17544, 26304, 35064, 43848, 52608,
     1           61368, 70128, 78912, 87672, 96432,105192,113976,
     2          122736,131496,140256,149040,157800,166560,175320,
     3          184104,192864,201624,210384,219168,227928,236688,
     4          245448,254232,262992,271752,280512,289296,298056,
     5          306816,315576,324360,333120,341880,350640/
      DATA NDAY/366,365,365,365,
     1          366,365,365,365,
     2          366,365,365,365,
     3          366,365,365,365,
     4          366,365,365,365,
     5          366,365,365,365,
     6          366,365,365,365,
     7          366,365,365,365,
     8          366,365,365,365,
     9          366,365,365,365/
      DATA IZPT/59/
C
C         SCREEN INPUT.
C
      IF ((IYR .GT. 59) .AND. (IYR .LT. 100)) GO TO 100
      WRITE(IO,1000) IYR
      GO TO 990
C
  100 IF ((IJD .GT. 0) .AND. (IJD .LT. 367)) GO TO 200
      WRITE(IO,1010) IJD
      GO TO 990
C
  200 IF ((IHR .GT. 0) .AND. (IHR .LT. 25)) GO TO 300
      WRITE(IO,1020) IHR
      GO TO 990
C
  300 NYR = IYR - IZPT
      IF (IJD .LE. NDAY(NYR)) GO TO 400
      WRITE(IO,1030) IJD,IYR
      GO TO 990
C
C         CONVERT YEAR/JULIAN DAY/HOUR TO COMMON SEQUENTIAL HOUR.
C
  400 IYDH = ICUM(NYR) + (IJD - 1) * 24 + IHR
      GO TO 999
C
C         ERROR PROCESSING.
```

```
C
  990 IYDH = -999999
C
  999 RETURN
C
C           FORMAT STATEMENTS.
C
 1000 FORMAT('0*** YEAR INPUT (',I4,') IS NOT WITHIN RANGE OF 60-99.')
 1010 FORMAT('0*** JULIAN DAY INPUT (',I4,') IS NOT WITHIN RANGE OF ',
     1       '1-366.')
 1020 FORMAT('0*** HOUR INPUT (',I4,') IS NOT WITHIN RANGE OF 1-24.')
 1030 FORMAT('0*** JULIAN DAY INPUT (',I4,') CANNOT BE USED FOR YEAR ',
     2       I2,'; THIS IS NOT A LEAP YEAR.')
      END
      SUBROUTINE ICHRON(IYDH,IYR,IJD,IHR)
C        ICHRON-CONVERT-DATE
C
C        ARGUMENT LIST:
C          INPUT:    IYDH - COMMON SEQUENTIAL HOUR
C          OUTPUT:   IYR  - YEAR (2 DIGITS)
C                    IJD  - JULIAN DAY (3 DIGITS)
C                    IHR  - HOUR (2 DIGITS)
C
C        CALLING ROUTINES:
C          TP240
C
C        DESCRIPTION:
C          THIS SUBROUTINE CONVERTS A COMMON SEQUENTIAL HOUR TO A DATE
C          BETWEEN 1960 AND 1999.  THE ZERO POINT IS 1959, 365, 24,
C          I.E., HOUR 1 IS THE FIRST HOUR OF 1960.
C
      DIMENSION ICUM(41),NDAY(40)
      COMMON /INOUT/ IN,IO
      DATA ICUM/     0,  8784, 17544, 26304, 35064, 43848, 52608,
     1           61368, 70128, 78912, 87672, 96432,105192,113976,
     2          122736,131496,140256,149040,157800,166560,175320,
     3          184104,192864,201624,210384,219168,227928,236688,
     4          245448,254232,262992,271752,280512,289296,298056,
     5          306816,315576,324360,333120,341880,350640/
      DATA NDAY/366,365,365,365,
     1          366,365,365,365,
     2          366,365,365,365,
     3          366,365,365,365,
     4          366,365,365,365,
     5          366,365,365,365,
     6          366,365,365,365,
     7          366,365,365,365,
     8          366,365,365,365,
     9          366,365,365,365/
      DATA IZPT/59/
C
C           SCREEN INPUT.
C
      IF ((IYDH .GT. ICUM(1)) .AND. (IYDH .LE. ICUM(41))) GO TO 100
      WRITE(IO,1000) IYDH
      IYR = -999999
      IJD = -999999
      IHR = -999999
      GO TO 999
C
C           CONVERT COMMON SEQUENTIAL HOUR TO YEAR/JULIAN DAY/HOUR.
C
  100 NYR = IYDH/8760 + 1
C
  200 DIFF = IYDH - ICUM(NYR)
      IF (DIFF.GE. 0.) GO TO 300
      NYR = NYR - 1
      GO TO 200
C
  300 IF (DIFF .NE. 0.) GO TO 400
```

```
C          IS THE LAST HOUR OF THE PREVIOUS YEAR.                       TPP23110
      NYR = NYR - 1                                                     TPP23120
      IYR = NYR + IZPT                                                  TPP23130
      IJD = NDAY(NYR)                                                   TPP23140
      IHR = 24                                                          TPP23150
      GO TO 999                                                         TPP23160
C                                                                       TPP23170
  400 IYR = NYR + IZPT                                                  TPP23180
      IHTY = DIFF                                                       TPP23190
      IJD = IHTY/24                                                     TPP23200
      IHR = IHTY - IJD * 24                                             TPP23210
      IF (IHR.EQ.0) THEN                                                TPP23220
      IHR = 24                                                          TPP23230
      ELSE                                                              TPP23240
      IJD = IJD + 1                                                     TPP23250
      END IF                                                            TPP23260
C                                                                       TPP23270
  999 RETURN                                                            TPP23280
C                                                                       TPP23290
C          FORMAT STATEMENTS.                                           TPP23300
C                                                                       TPP23310
 1000 FORMAT('0*** COMMON SEQUENTIAL HOUR INPUT (',I7,') IS NOT ',      TPP23320
     1       'WITHIN THE REQUIRED RANGE FOR CONVERSION TO DATES ',      TPP23330
     2       'BETWEEN YEARS 60 AND 99.')                                TPP23340
      END                                                               TPP23350
```

Date ________________

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I would like to receive future revisions to the "TUPOS-P User's Guide."

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